Rock Products

Vol. XXIII, No. 20 September 25, 1920

Circulation 5300 copies, net

Applicant for membership in Audit Bureau of Circulations

Second class entry at U. S. Post Office

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Founded 1902

Nathan C. Rockwood ..... Editor
Chas. A. Breskin ..... Assistant Editor

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CHAS. H. FULLER, Mgr. New York Office, 101 West 41st St., New York City

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"The Ideal Machine to Fill the Gap Between the Hand Shovel and the Steam Shovel"

Says W. W. Purdy, Surveyor of Holmes County, Millersburg, Ohio, concerning the

Jeffrey Radial Loader

Under Date of Aug. 3d, Mr. Purdy Writes Us:

"We have had your Radial Loader in service for about two months, loading dump trucks with run of bank gravel for road purposes.

"I consider it the ideal machine to fill the gap that has hitherto existed in industrial equipment between the hand shovel and the steam shovel.

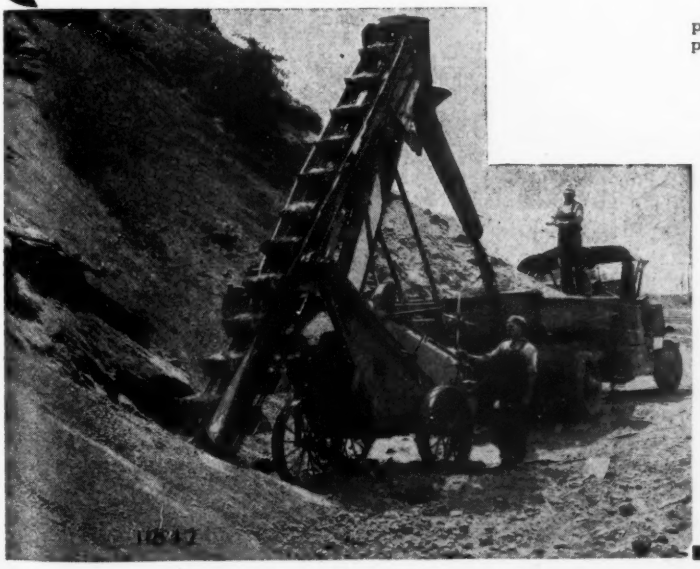
"We are using three to four trucks hauling about 1½ miles and the trucks are only idle about four minutes while loading, while the loader has considerable periods of idleness between trucks."

Jeffrey Radial Loaders

Catalogs No. 288-N and 309-H fully illustrate and describe both types of Radial Loaders.

Dig 8 to 10 feet into the pile.
Do not require hand shoveling or mechanical devices to bring material to buckets.
Release 5 to 10 men for other work.
Built for heavy service.
Can be operated by unskilled labor.
Maintenance costs are small.

Jeffrey Radial Loader in operation at the pit of Holmes County, Millersburg, Ohio.



Radial Loaders Are Built in Two Sizes

Type "K" has a capacity of 1 cubic yard per minute. Type "G" 1½ to 2 cubic yards per minute.

The Jeffrey Mfg. Company

935 North Fourth Street
Columbus, Ohio

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VULCAN INDUSTRIAL LOCOMOTIVES and leading Industrial Concerns

II—*Donner Steel Company*

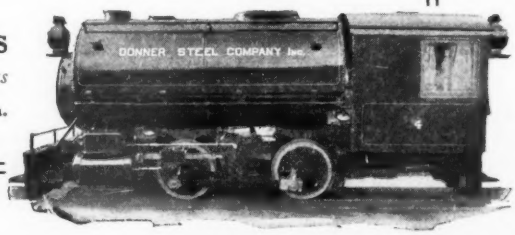
QUALITY D SERVICE

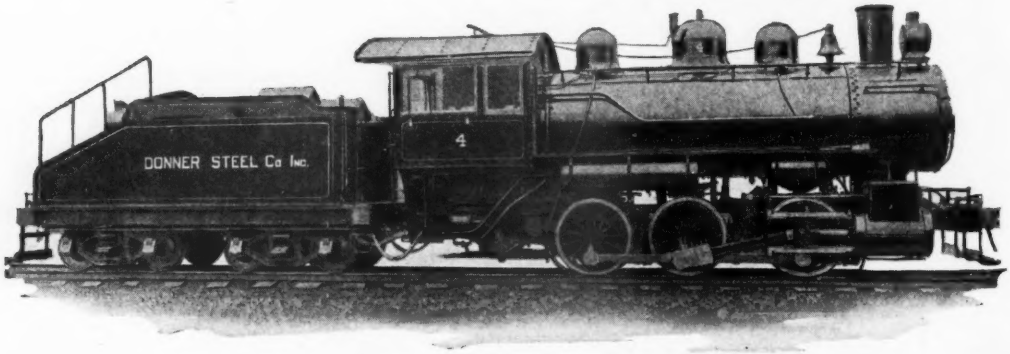
The motto of this company is indicative of the progressive spirit back of its success.

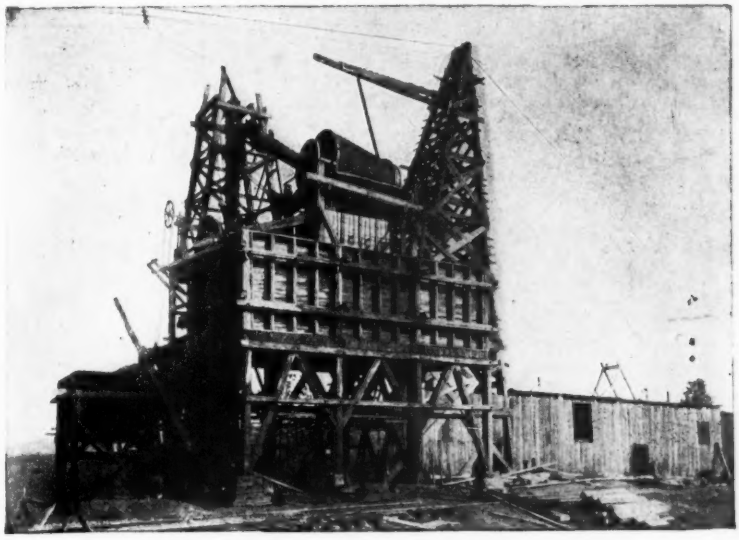
VULCAN Locomotives have back of them the performance records that are a logical outgrowth of strict attention to the quality of workmanship and of sound materials coupled with nearly fifty years of locomotive building.

Industrial locomotives should be designed for the work they are to do

VULCAN IRON WORKS
Locomotive Builders for 49 years
1753 Main St., Wilkes-Barre, Pa.







WEBSTER SERVICE

Back of every Webster installation is an engineering plan which is permanently reflected in wonderful service performance at low operating cost, because each equipment is exactly fitted to the work it will be called upon to perform. Not only are Webster engineers unrestricted by a limited range of sizes and designs, but they have access to engineering records covering nearly a half century of uninterrupted achievement.

Your specific conveying problem may present peculiar conditions, or may be complicated by unusual factors which seem to be impossible to overcome. Yet these problems can be quickly solved by Webster engineers, representing, as they do, a development in material handling practice far in advance of many present day conveying problems.

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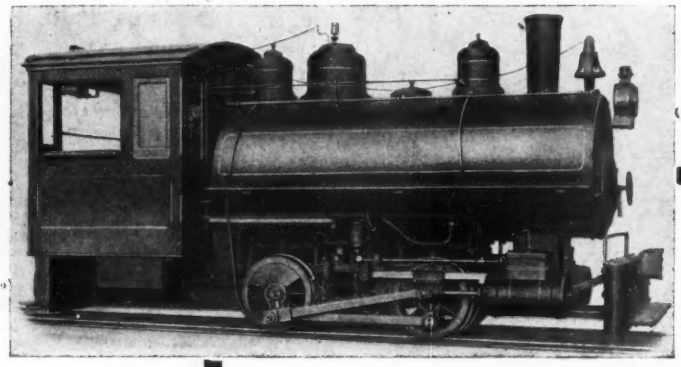
FACTORIES CHICAGO AND TIFFIN, OHIO. SALES OFFICES IN PRINCIPAL CITIES



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LOCOMOTIVES

A significant fact, in view of the general claims of engine builders — is that the United States Steel Corporation — one of the most careful buyers in the industrial field — has nearly 600 *Porter* locomotives in actual service.

H. K. PORTER CO., Pittsburgh, Pa.

TELSMITH SIMPLIFIES YOUR CRUSHING PLANT

In old-fashioned crushing plants, you will frequently find a big gyratory breaker (No. 9, 10 or 12) followed by two No. 6 or No. 7½ machines, with four No. 5 outfits to finish the product down to 1½-inch size and under. In the modern plant, two No. 4 Telsmith Reduction Crushers do the work of those six re-crushers, at the same time making a finer and more uniform product. We say Telsmith is doing just that thing; and—

WE CAN BACK UP THE STATEMENT. Get our bulletin No. 4 F 11 (Telsmith Reduction Crushers) and catalog No. 166 (Telsmith Primary Breakers).

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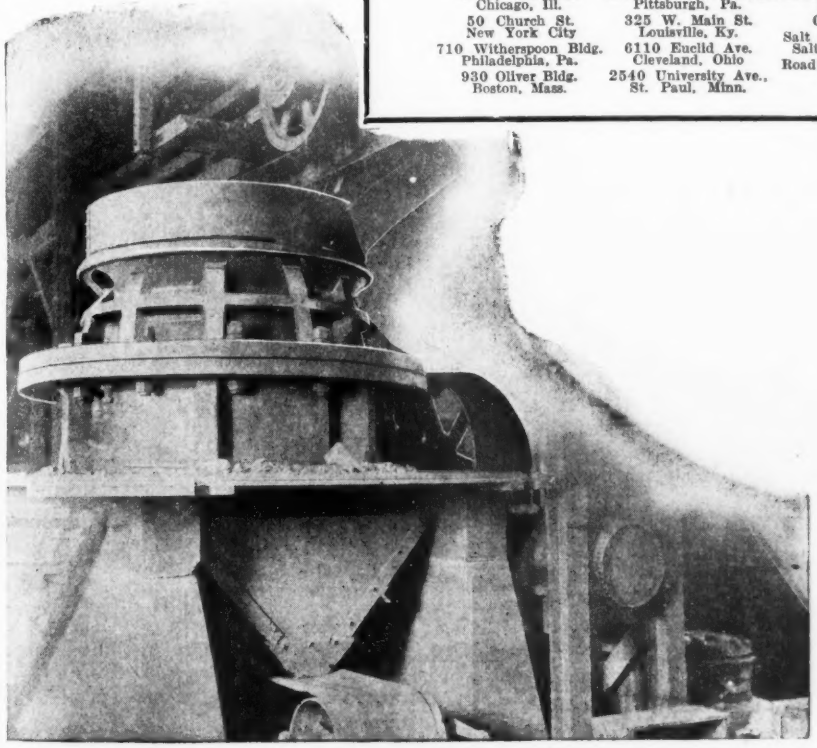

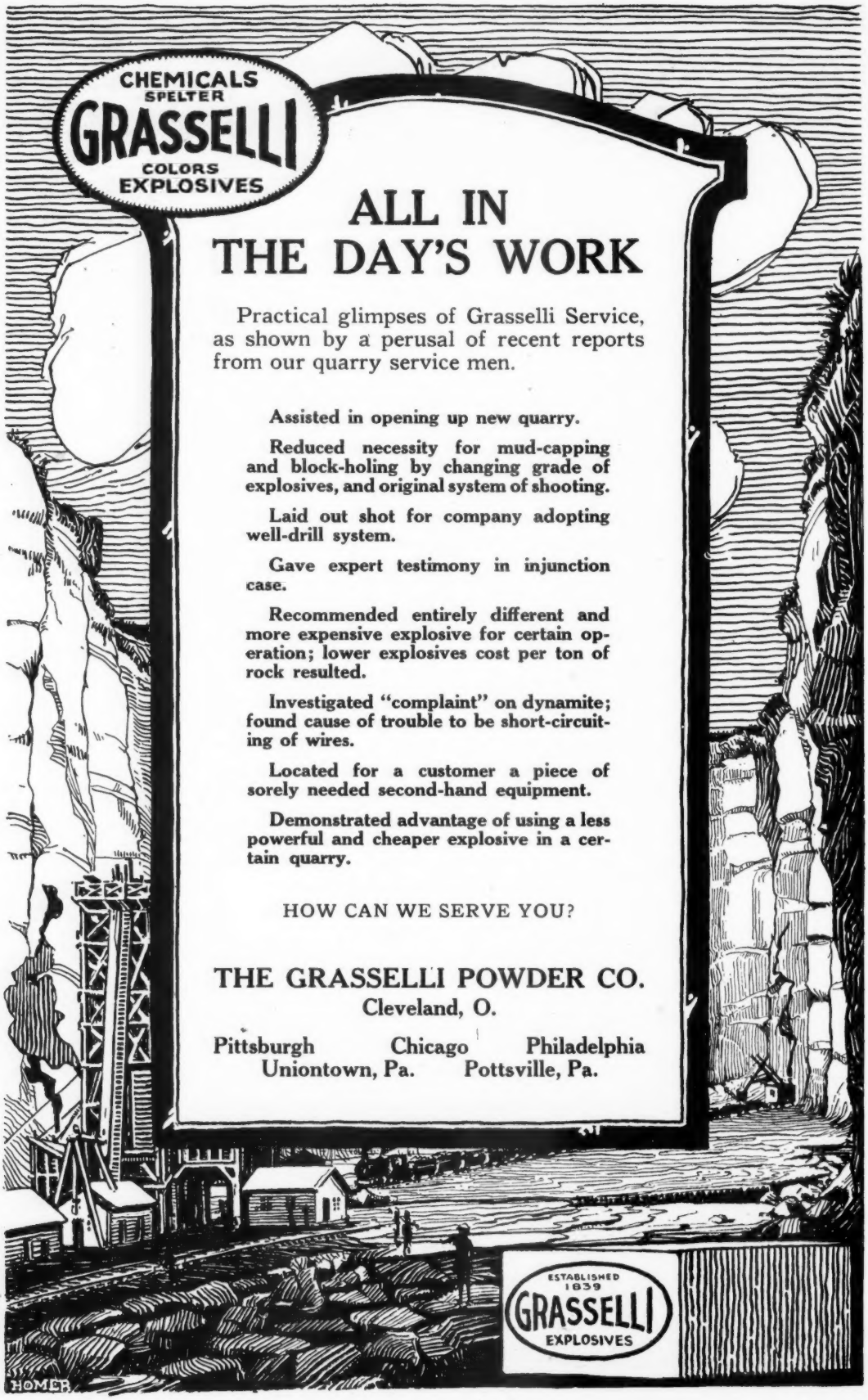
CHEMICALS
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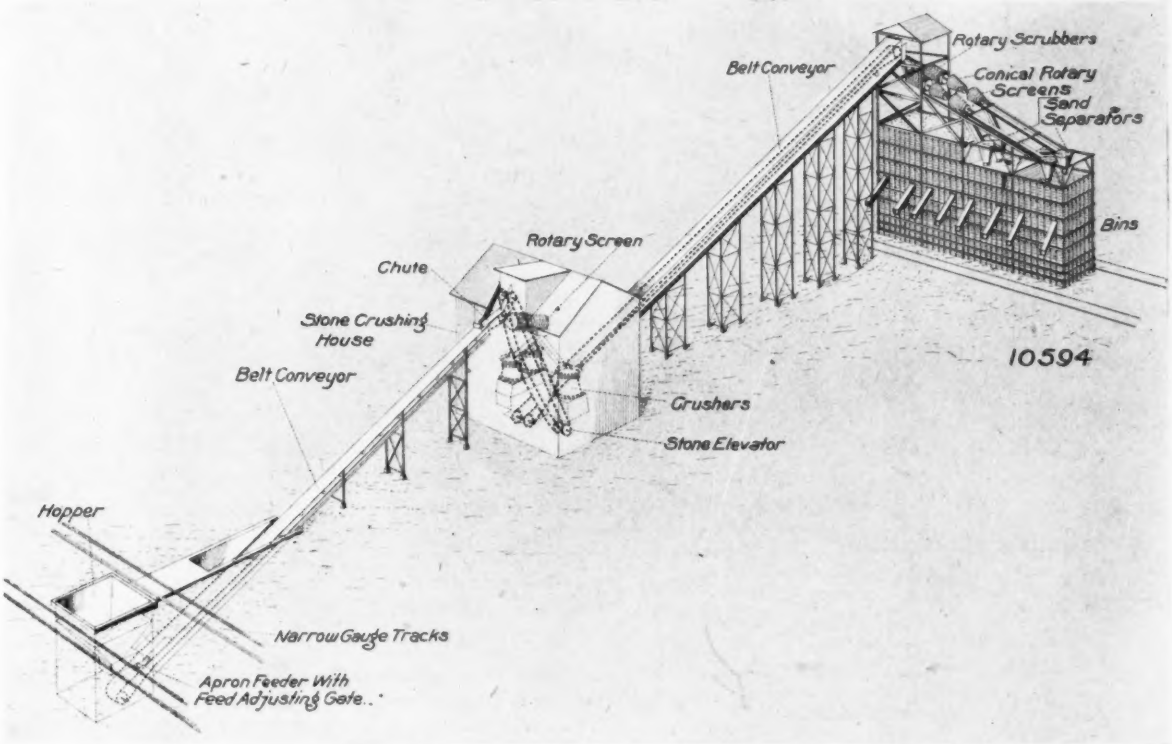
ALL IN
THE DAY'S WORK
Practical glimpses of Grasselli Service, as shown by a perusal of recent reports from our quarry service men.
Assisted in opening up new quarry.
Reduced necessity for mud-capping and block-holing by changing grade of explosives, and original system of shooting.
Laid out shot for company adopting well-drill system.
Gave expert testimony in injunction case.
Recommended entirely different and more expensive explosive for certain operation; lower explosives cost per ton of rock resulted.
Investigated "complaint" on dynamite; found cause of trouble to be short-circuiting of wires.
Located for a customer a piece of sorely needed second-hand equipment.
Demonstrated advantage of using a less powerful and cheaper explosive in a certain quarry.
HOW CAN WE SERVE YOU?
THE GRASSELLI POWDER CO.
Cleveland, O.
Pittsburgh Chicago Philadelphia
Uniontown, Pa. Pottsville, Pa.
ESTABLISHED 1839
GRASSELLI
EXPLOSIVES
HOMER

LINK-BELT

Sand and Gravel Washing Plants



Typical Link-Belt Sand and Gravel Washing Plant

LINK-BELT engineers have spent years in the study and development of methods for the efficient production of sand and gravel. They are specialists in this work.

Each Link-Belt plant is built to secure the greatest commercial advantages for its owners—whether the desired output be 10 or 300 carloads a day.

Each plant has its individuality, and the details of design make it the most efficient for its work, from every standpoint—economy of operation—high quality of material—simplicity—durability—reliability, etc.

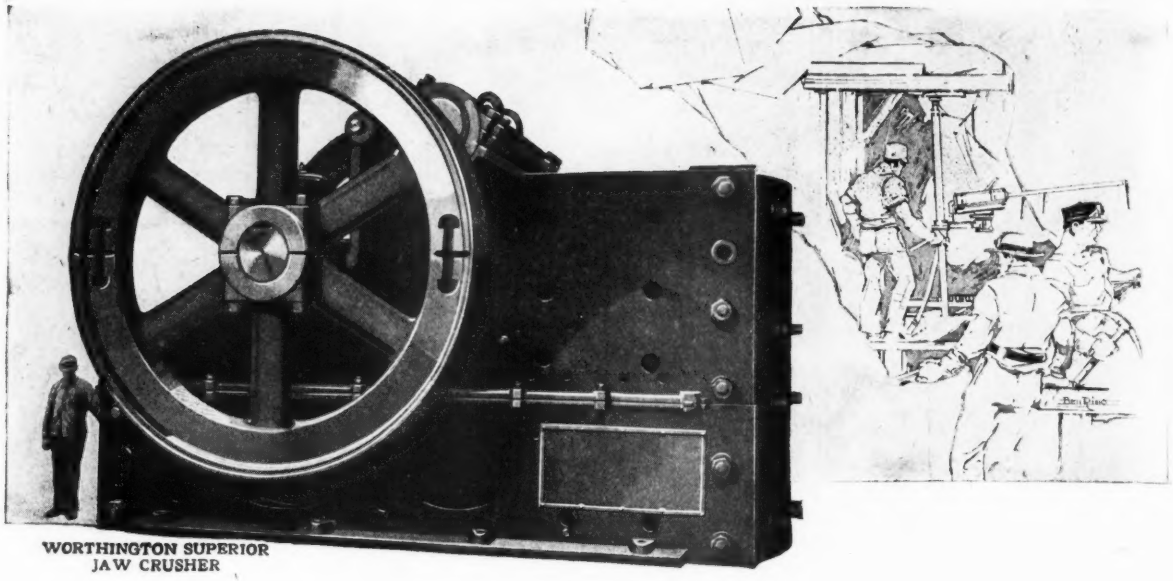
Link-Belt screens, scrubbers, sand separators, excavators, spouts, gates, feeders, water pans, belt conveyors, bucket elevators, etc., are features of Link-Belt plants that earn dividends for their users.

If you contemplate additions to, or changes in your present equipment, or a new plant, why not put your problem up to our engineers? Send for catalog.

LINK-BELT COMPANY 605

Chicago—329 W. 39th Street **Philadelphia—Hunting Park Ave. and P. & R. Ry.**

Other Offices in Principal Cities



WORTHINGTON SUPERIOR
JAW CRUSHER

Keeping Pace with the Steam Shovel

SINCE the steam shovel with its large capacity has earned its way into the rock crushing field, crushing machinery capacity has had to keep pace also. Larger machines compelled new style construction of which Superior Jaw Crusher is successfully representative.

This machine is built in the same shop by the same men that built the famous Superior McCully Gyratory. And here too, at our Power and Mining Works, Cudahy, Wis., is headquartered a designing service which aids Worthington clients to solve their crushing problems by advising not only proper machine selection, but also installation.

Worthington also build a complete line of Cement Machinery—Rotary Kilns, Dryers, Coolers, Screens, Elevators, Tube Mills, Ball Compartment Mills, etc.

Other Worthington Products

Gyratory Crushers, Jaw Crushers, Air Compressors, Mine Pumps, Revolving Stone Screens, Ball and Tube Mills.

To further enlarge their service, Worthington have acquired the good-will and mechanical equipment of the Platt Iron Works, Dayton, Ohio, for manufacturing Oil Mill Machinery, Hydraulic Turbines, Feedwater Heaters and High Pressure Air Compressors.

WORTHINGTON PUMP AND MACHINERY CORPORATION
Executive Offices: 115 Broadway, New York City
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Blake & Knowles Works
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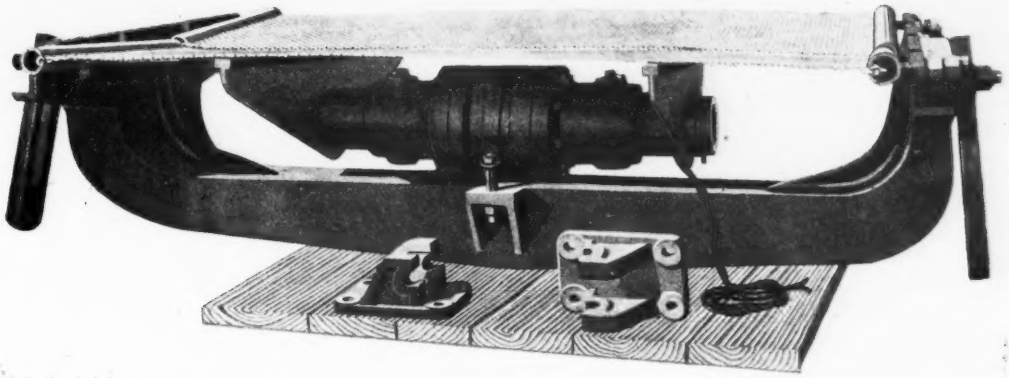
Worthington Works
Harrison, N. J.
Laidlaw Works, *Cincinnati, Ohio.*

Hazleton Works, *Hazleton, Pa.*

Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works
Cudahy, Wis.
Snow-Holly Works
Buffalo, N. Y.
Epping-Carpenter, *Pittsburgh, Pa.*

Companies Which Have Ordered MITCHELL ELECTRIC VIBRATING SCREEN

United States and Foreign Patents Applied for



Note the following list of companies who are now using or who have ordered the Mitchell Electric Vibrating Screen. They represent seven different industries, and include some of the largest concerns of their kind in the world.

Tintic Milling Co., Silver City, Utah
Pope-Shenan Mining Co., Salmon, Idaho
Timber Butte Milling Co., Butte, Mont.
Factory Products Corp.
(Messina Development Co., South Africa)
Chief Consolidated Mining Co., Eureka, Utah
Utah Salduro Co., Salduro, Utah
Federal Lead Co., Flat River, Mo.
Armour Fertilizer Co., Atlanta, Ga.
American Zinc Co., Mascot, Tenn.
St. Joseph Lead Co., Bonne Terre, Mo.
Golden Cycle M. & R. Co., Aysee, Colo.
Bunker Hill Sullivan, Kellogg, Idaho
Milwaukee Coke & Gas Co., Milwaukee, Wis.
J. G. White Engineering Co., New York City
The Utah Mine, Gold Hill, Utah
Fountain Sand & Gravel Co., Pueblo, Colo.
John Herzog & Son, Forest, Ohio
Miami Copper Co., Miami, Arizona
Portage Silica Co., Phalanx, Ohio
Ohio Marble Co., Piqua, Ohio
Stone Products Co., Bedford, Ind.
Casparis Stone Co., Havre de Grace, Md.
Wisconsin Granite Co., Sioux Falls, S. D.
Bessemer Limestone Co., Youngstown, Ohio
Wharton Steel Co., Wharton, N. Y.
Cerro de Pasco Copper Corp., New York
Solvay Process Co., Detroit, Mich.
Basic Products Co., Pittsburgh, Pa.
Alvarado Mining & Milling Co., Parrall, Mexico
Cerro de Pasco Corp., Parrall, Mexico
Smelting Department, Peru, S. A.
Southern Agricultural Chemical Corp., Birmingham, Ala.

Our illustrated booklet fully explains the unique construction of the Mitchell. We believe it will be as interesting to you as it proved to be to the concerns listed above. It makes clear the reasons for its unequaled economy, capacity and efficiency. We shall be glad to send you this treatise upon request.

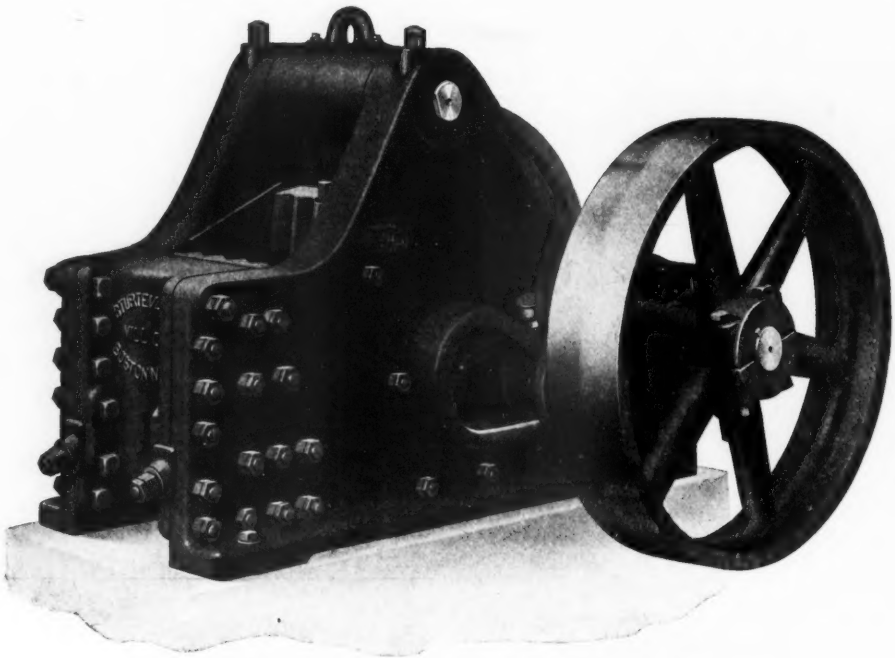
Stimpson Equipment Company

315 Felt Building **Salt Lake City, Utah**

STURTEVANT "OPEN-DOOR" MACHINERY

"ONE MAN - ONE MINUTE" ACCESSIBILITY

CRUSHING, GRANULATING, GRINDING, PULVERIZING, SCREENING, MIXING, ELEVATING & CONVEYING.



DOUBLE CAM AND ROLL JAW CRUSHER
FOR COARSE, INTERMEDIATE AND FINE CRUSHING

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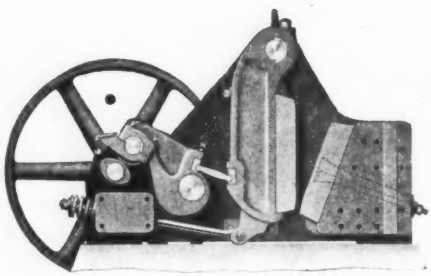

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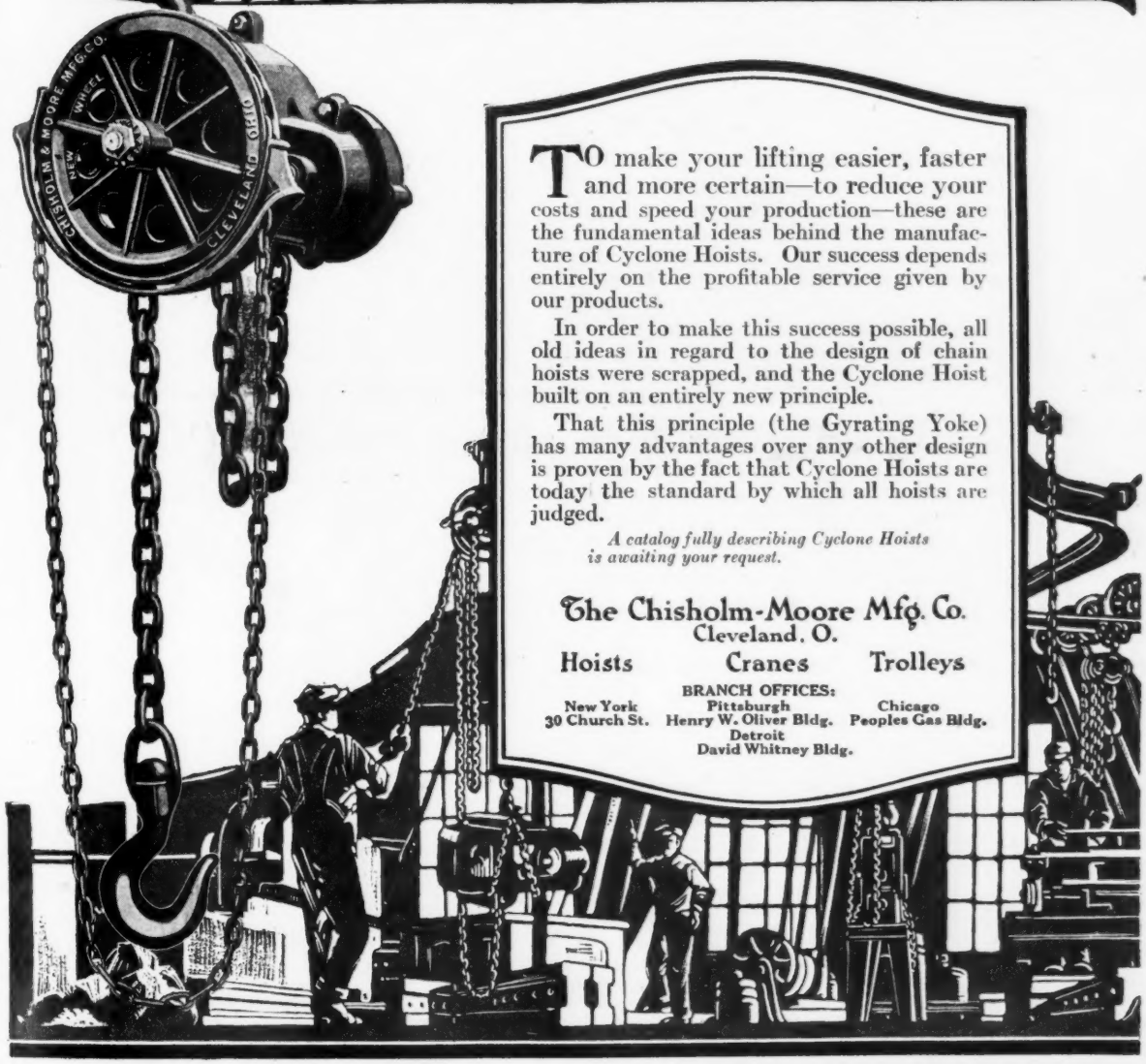

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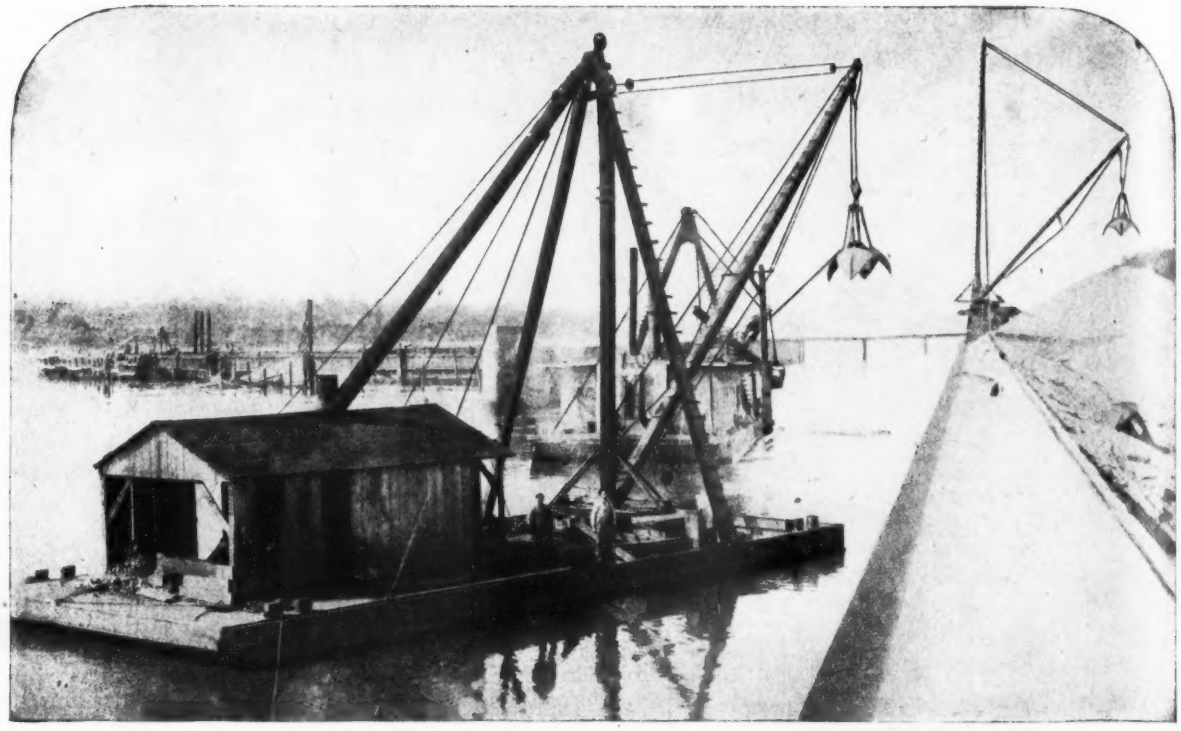

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The operator of an "AMERICAN" Barge Derrick said that. His derrick is part of the Government fleet engaged in river improvement work at Smithsonia, Ark.

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Vertical Cross Section of wall showing the Preston-Lansing method of reinforcing.

Nothing Better for Storing Limestone, Sand, Glass Batch Bins, etc.

"We believe there is nothing on the market that will make a better storage bin for limestone, glass, sand or any such material than your 'ship-lap' Vitrified Tile Storage Bins provided with reinforcing of proper size twisted steel bars to each layer of tile," says the Becker Limestone Company, whose Preston-Lansing Storage Bin is illustrated below.

Preston Lansing Tile Storage Bins

—reduce fire hazards—are moisture-proof and have no upkeep expense. Our special method of construction makes a bin with strength to withstand any strain. The blocks are braced against each other in "ship-lap" formation and reinforced between each tier by a twisted steel bar embedded in a thick layer of concrete.

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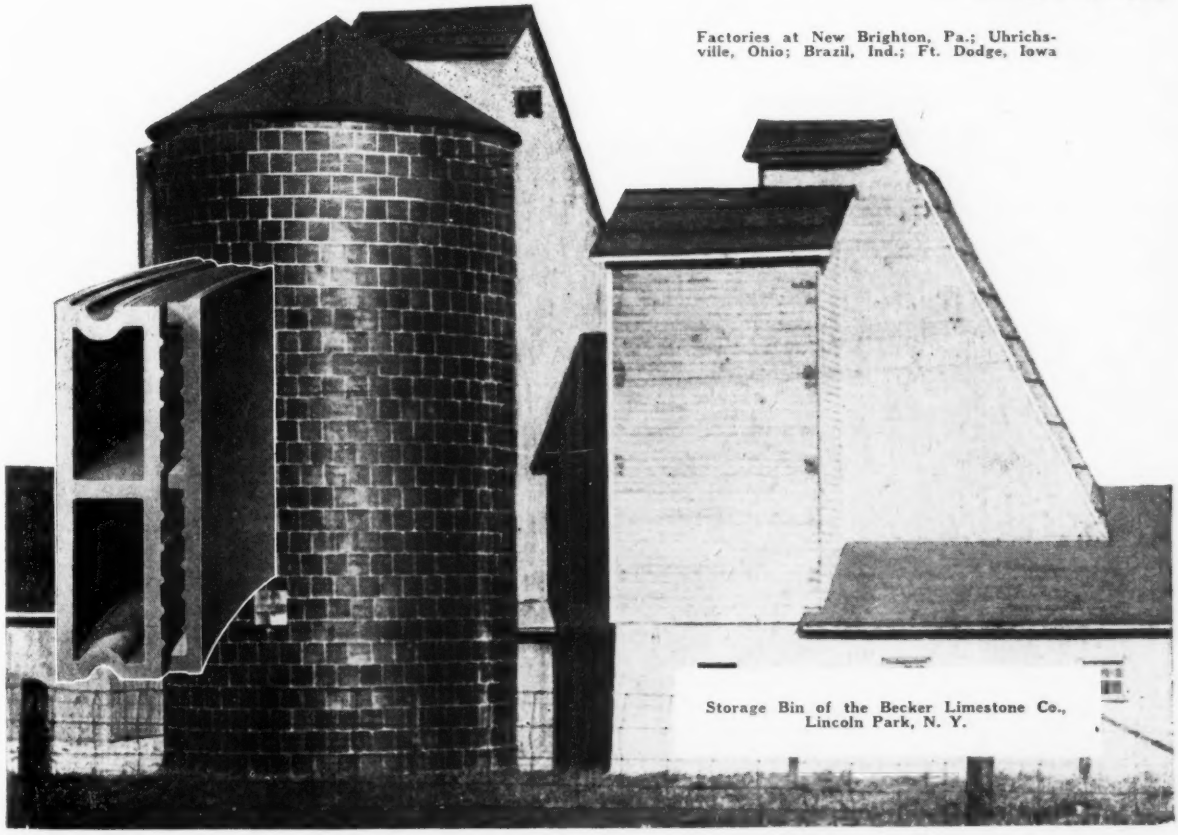
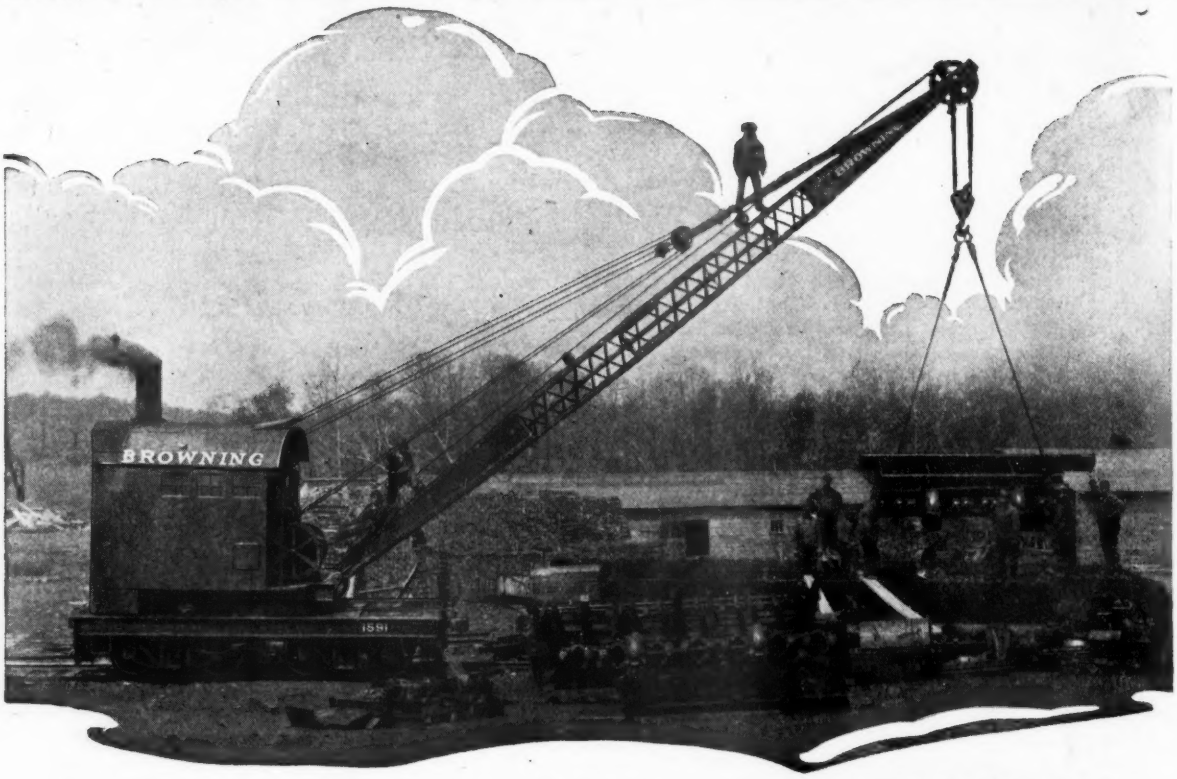


Storage Bin of the Becker Limestone Co., Lincoln Park, N. Y.



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This certainty of operation, this in-built ruggedness, coupled with the ability to perform a wide range of profitable service is the result of years of experience by practical engineers.

That our constant endeavor to produce a crane which will give more than ordinary satisfaction is appreciated, is shown by the large number of firms that are buying nothing but "Browning" cranes.

Any concern using hand labor to move materials in quantity should get in touch with us. Browning Cranes have an interesting record covering all lines of industry.

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LOCOMOTIVE CRANES

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Properly placed and fired, Aetna Explosives bring down the entire mass—*broken to the right size for the crushers*—at the first shot. A clean job every time!

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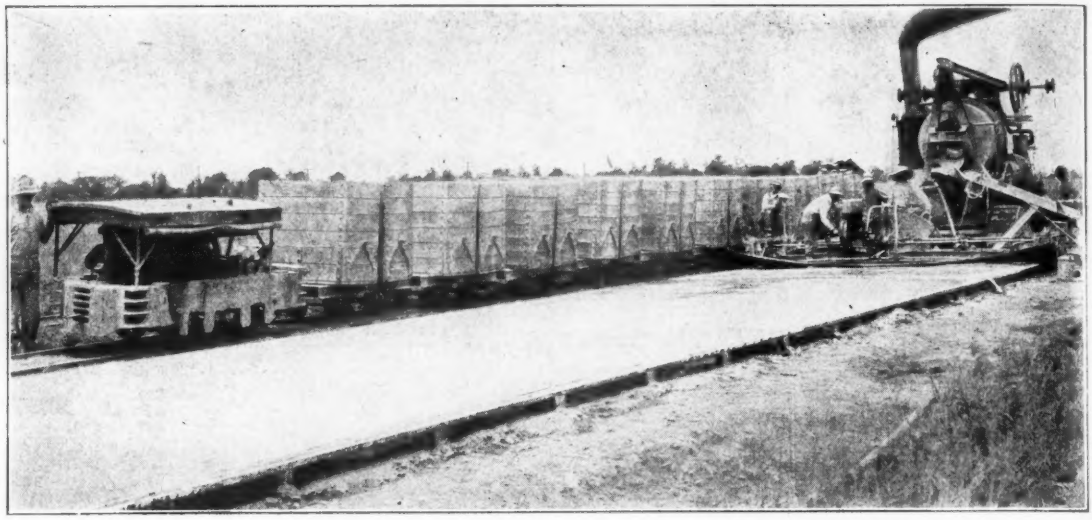

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Two 3-Ton PLYMOUTH Gasoline Locomotives hauling 20 loaded batch cars three miles enabled Allan J. Parrish to pour and finish 744 feet of concrete road, 14 feet wide, in one work day.

The operation view above was snapped three miles south of Oliver, Illinois, where everything was running as smooth as a satin ribbon, and everybody happy.

Some people talk about haulage problems. Haulage is never a problem if you can lay a track and pin your faith to a Plymouth.

It is the Plymouth Locomotive that bridges the gap between your apportioning plant and the mixer. They keep both ends busy and fatten the profit side of the ledger. Ask us about them.

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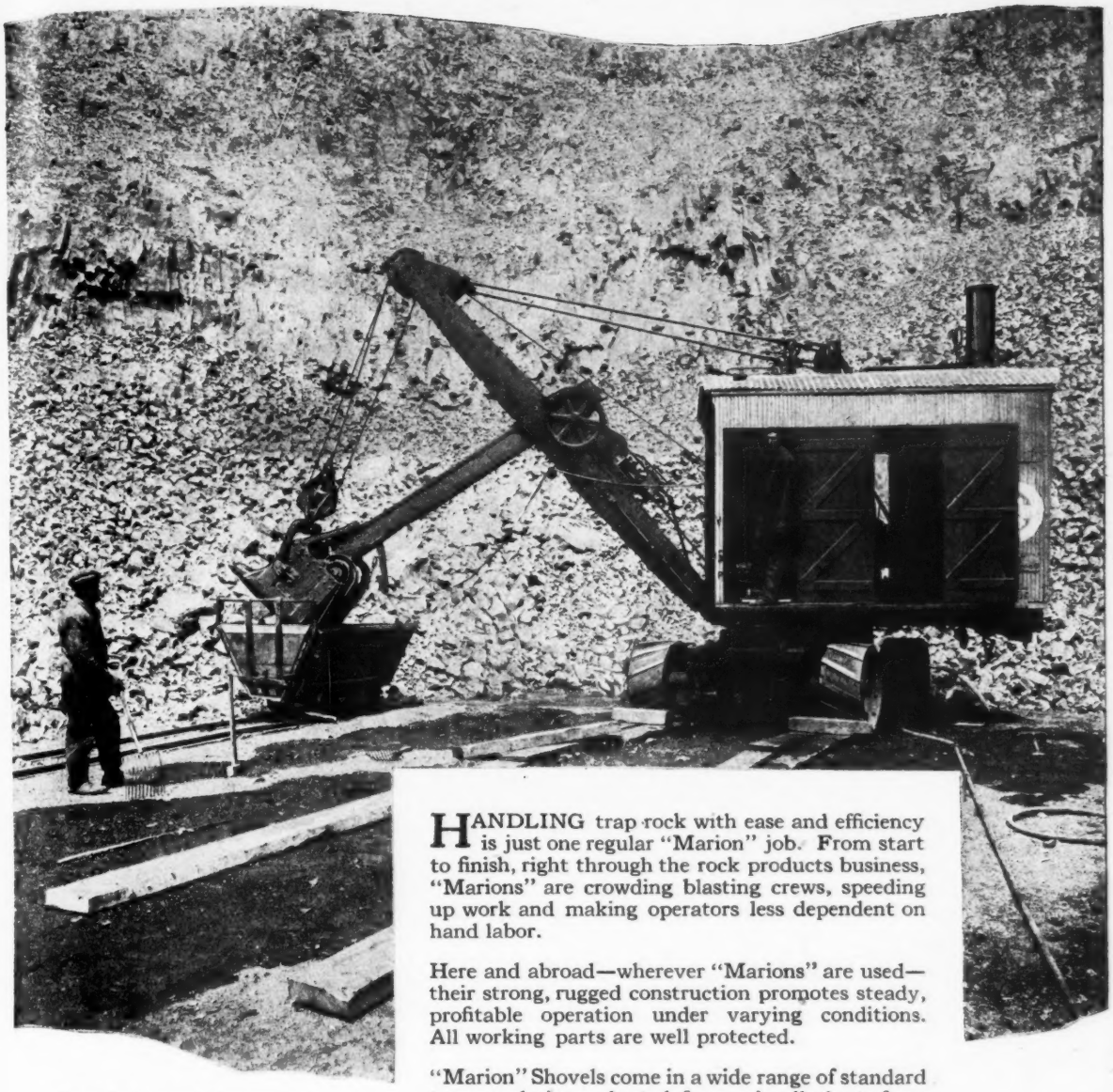
PLYMOUTH

Gasoline Locomotives



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"Marion" Shovels come in a wide range of standard types and sizes adapted for use in all plants from the very large to the very small. And our policy of concentrated production assures every "Marion" customer quicker deliveries than formerly.

Our thirty-six years of sound, successful, shovel-making experience is free for you to draw upon. We're always glad to furnish recommendations and estimates—write us today all about *your* problem.

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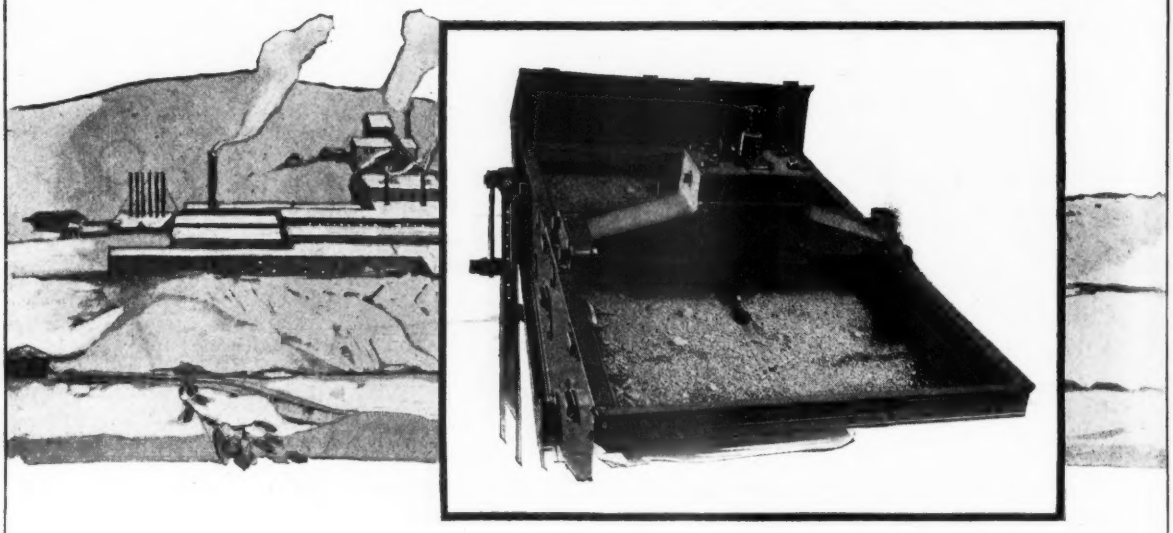

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"Makes wire cloth screen faster and wear longer"

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IN THE HUM-MER Inclined Screen, electro-magnetic vibration has been commercially applied in the screening art for the first time in history.

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The combining of drumhead tension with electro-magnetic vibration, produces an intense, powerful vibration which makes the HUM-MER stand out as distinctly different and far more efficient than any other means of separation.

THE INTENSITY OF THE VIBRATION CAN BE REGULATED TO MEET ANY CONDITION OF MATERIAL WHETHER COARSE, FINE OR OF VARYING MOISTURE CONTENT.

The sorting action in the HUM-MER is so effective that wonderful results in *tonnage* and *close separation* are produced.

The HUM-MER will handle either coarse or fine material, in fact, it will handle fine sizing in a manner that has never been possible heretofore. It will also handle many materials that could not be handled by other types of screening equipment.

THE W. S. TYLER COMPANY, *Cleveland, Ohio*

Manufacturers of Woven Wire Screens and Screening Equipment

Rock Products

Vol. XXIII | Chicago, September 25, 1920 | No. 20

Largest West Coast Crushed Stone Plant

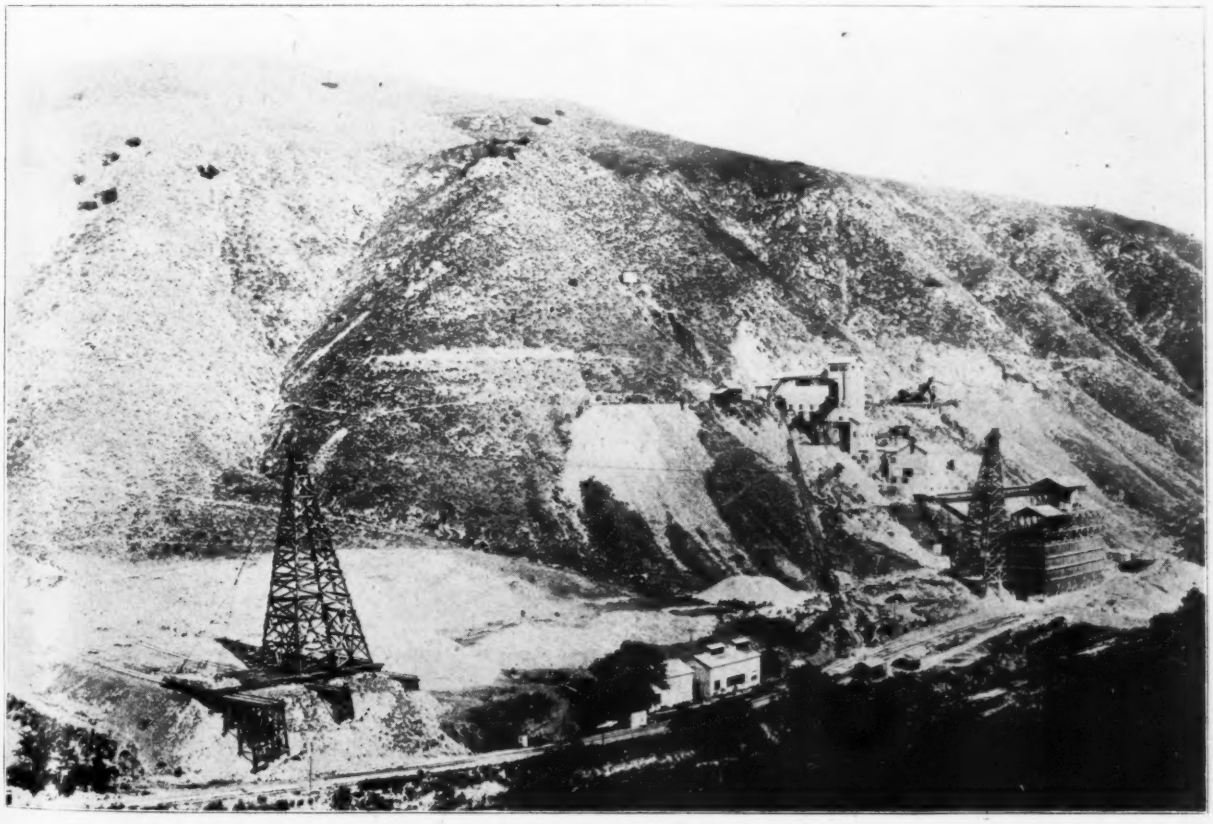
Blue Diamond Plaster Company of Los Angeles Takes Over the Temescal Rock Company, Corona, California, for Over Million Dollars—Complete Details of How This Remarkable Side-Hill Plant Operates

PROBABLY THE MOST EXTENsive commercial crushed stone operation on the Pacific Coast is that of the Blue Diamond Plaster Co., near Corona, which is about 20 miles from Los Angeles.

As the view below shows, the quarry is ideally located with a whole mountain of rock to draw upon. This rock is a hard blue rhyolite, short grained, breaking into angular fragments. It is very hard and durable and an excellent material for all the uses made of crushed stone. Its specific gravity is 2.65 and its weight per cubic foot, 167.5 lbs. Its French coefficient of wear, according to tests made by the U. S. Bureau of Public Roads, is 37.7 and its hardness 19. It has a tensile strength of 2245 lbs. per sq. in., and a crushing strength of 39,500 lbs. per sq. in. Thus it ranks with Eastern trap rock in most particulars.

Quarry Operation

As in similar formations near Portland, Ore., it has been found impracticable to use well drills for blast holing, although they have been tried. Therefore all blasting is done by tunneling or coyote holes. A typical shot made at this quarry on June 30 last brought down between 75,000 and 100,000 tons of rock at an expenditure of 5½ tons of Trojan powder (starch powder). This is about 10 tons



General view of the Blue Diamond Plaster Co. plant near Corona, Calif. Note the cableway storage system

of rock to a pound of powder. (The ledge was already well shattered.) The average is 6 to 8 tons per pound of powder.

The broken rock is loaded by a 90-ton railway type steam shovel into 8-ton all-steel cars. These cars are equipped with electric motors and are operated from a central control tower by means of a third rail (Woodford system). The quarry face is not yet large enough for the cars to operate in a closed circuit, and the present method of quarry operation is found to be not well adapted to the system of central control.

The cars are very massive in construction and dump only from one side. The car bodies rest on a steel cradle and are tipped and dumped by a special car dumper.

Crushing Plant

The crushing plant is designed as a gravity proposition throughout. The quarry cars dump into a 66x84-in. jaw crusher. As the stone is tough and hard there is a tendency for good size chips to fly and consequently the crusher opening is well boxed in, as some of the views show.

As originally designed the plant had a large scalping screen between the primary and the secondary breaker. This is shown in one of the views. The material passing this screen was designed to fall into a bin below, while the rejections from the open end dropped vertically below, a distance 15 ft. or more, into a No. 9 gyratory crusher.

It is now found advisable to by-pass this large scalping screen and run the output of the initial jaw crusher direct into the bin, and the No. 9 gyratory is fed from this bin, by means of an improvised sliding gate. This gate is operated by the hoist shown in one of the views.

Following the No. 9 gyratory are two 60-in. by 12-ft. scalping screens. These screens take out everything less than 3-in. and the rejections of each screen are fed to a 48-in. Symons disc crusher—one at the end of each screen.

The material that passes the 3-in. holes in the two scalping screens goes direct to the sizing screens over the loading bins. This material first passes over a ½-in. grizzly, that removes the fine material and stripping, which is wasted.

This waste product is taken away by a separate belt conveyor to a bin over the railway tracks. It is taken by the railway and used for filling and general purposes without expense to the stone company for its removal.

From the 48-in. disc crushers the material joins the stream of stone passing the 3-in. scalping screens and is conducted by a 30-in. belt conveyor to the sizing screens on top of the screening house, which is built over the railway tracks.

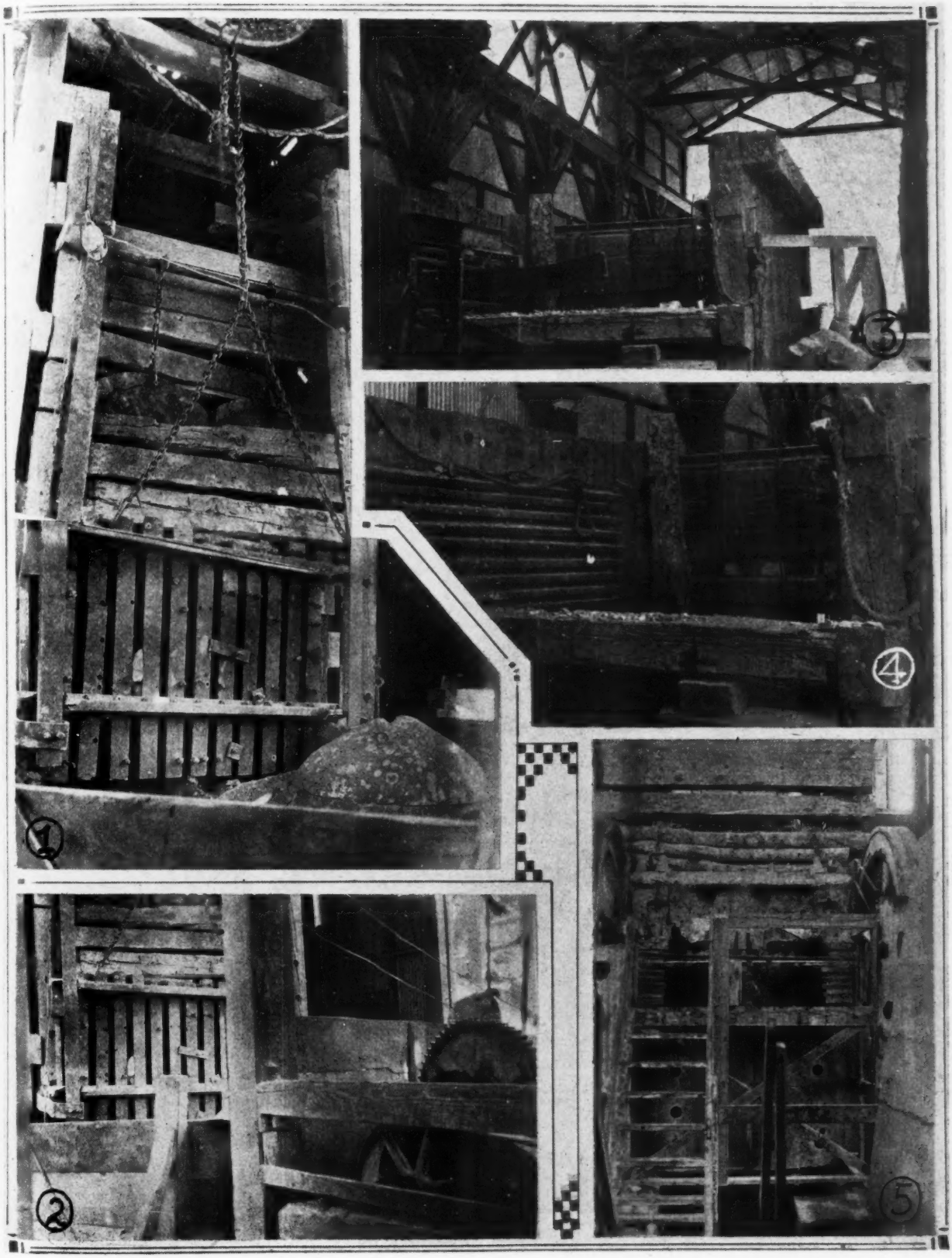
The sizing screens consist of one 60-in. by 20-ft. open end screen, and one 48-in. by 20-ft. closed end screen. The rejections from the open end screen are the few pieces of oversize that manage to get by the 48-in. disc crushers. They are sent to a 24-in. disc crusher on the bin house and returned to the sizing screens.

The hopper for each division of the sizing screen has chutes leading to each side of the screening house. These chutes feed into bins direct by gravity or to two parallel belt conveyors of the shuttle type—that is mounted on trucks so that the whole conveyor can be moved—so that they can be discharged into any one of the double row of bins, not reached by the gravity chutes.

Storage Facilities

Cars may be loaded at the bins and then run out under a cableway and unloaded into storage. This cableway provides for an immense ground storage.

Views 1 and 2 show quarry operation; (3) Cableway storage from the top of the screening plant; (4) Empty car storage and gravity incline to loading bins



Views 1 and 2 show bin and bin gate for feeding the secondary crusher; 3, 4 and 5 show various angles of the initial jaw crusher

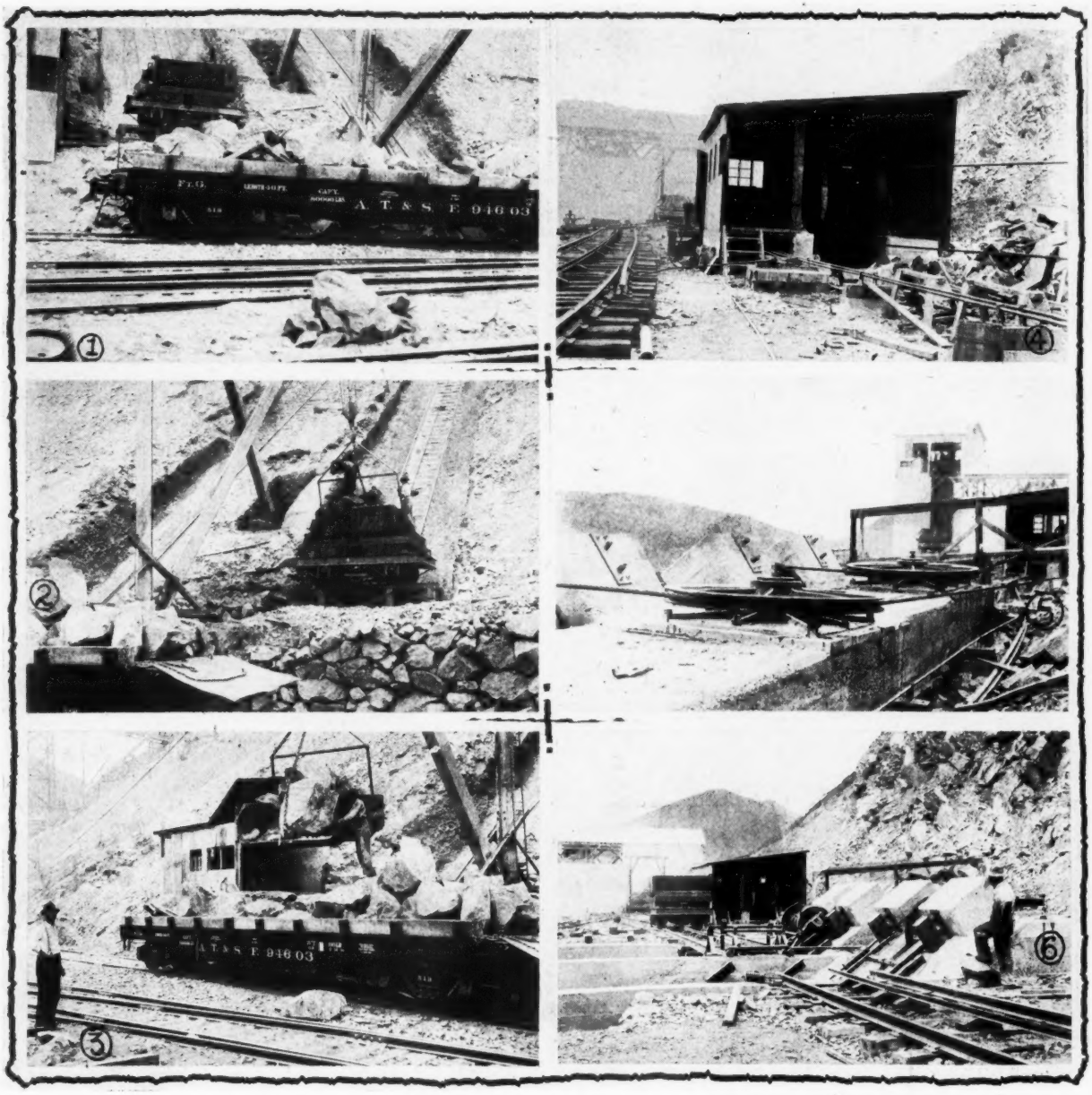
The towers are 135 ft. high and 800 ft. apart, thus providing storage for approximately 200,000 cu. yds. or 300,000 tons of stone.

The cars are unloaded into storage or loaded out of storage by a clam-shell bucket operated from a house on the tower nearest the plant. The farther tower is constructed on trucks which travel on a track way, as shown in one of the views, which permits the storage space to be materially widened if desired. The capacity of the storage-handling equipment is 600 tons per day in either direction.

Rip-Rap Loading

This plant also has a unique method of loading rip-rap out of the quarry. The quarry floor level is high above the railway level and the rip-rap stone is let down to the car-loading level on a special cable incline, shown in some of the views. The all-steel skip cars used on this incline hold approximately 10 tons each. The incline is operated as a balanced skip hoist, the loaded cars going down pulling up the empty on the other track. An electric-motor-driven hoisting drum is of course provided to regulate the speed and to start the operation.

The skips are loaded at the quarry by



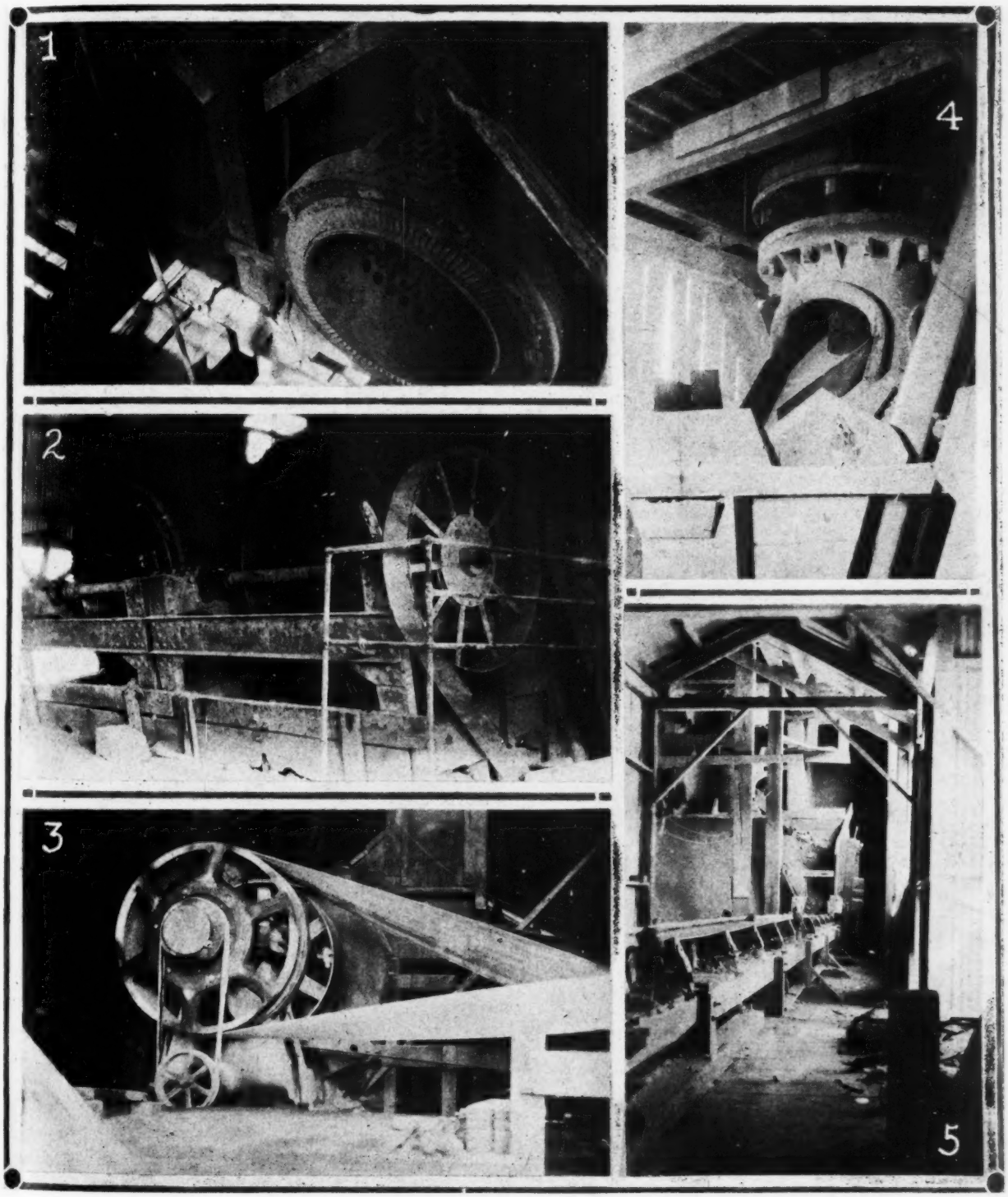
Insert above, A. S. St. John (left), and Carl Leonardt (right); views below show various details of the rip-rap loading incline of the quarry

the same cars that serve the crushing plant. At the bottom of the incline the skips are dumped by being picked up off the trucks by a derrick and then they are emptied into railway cars.

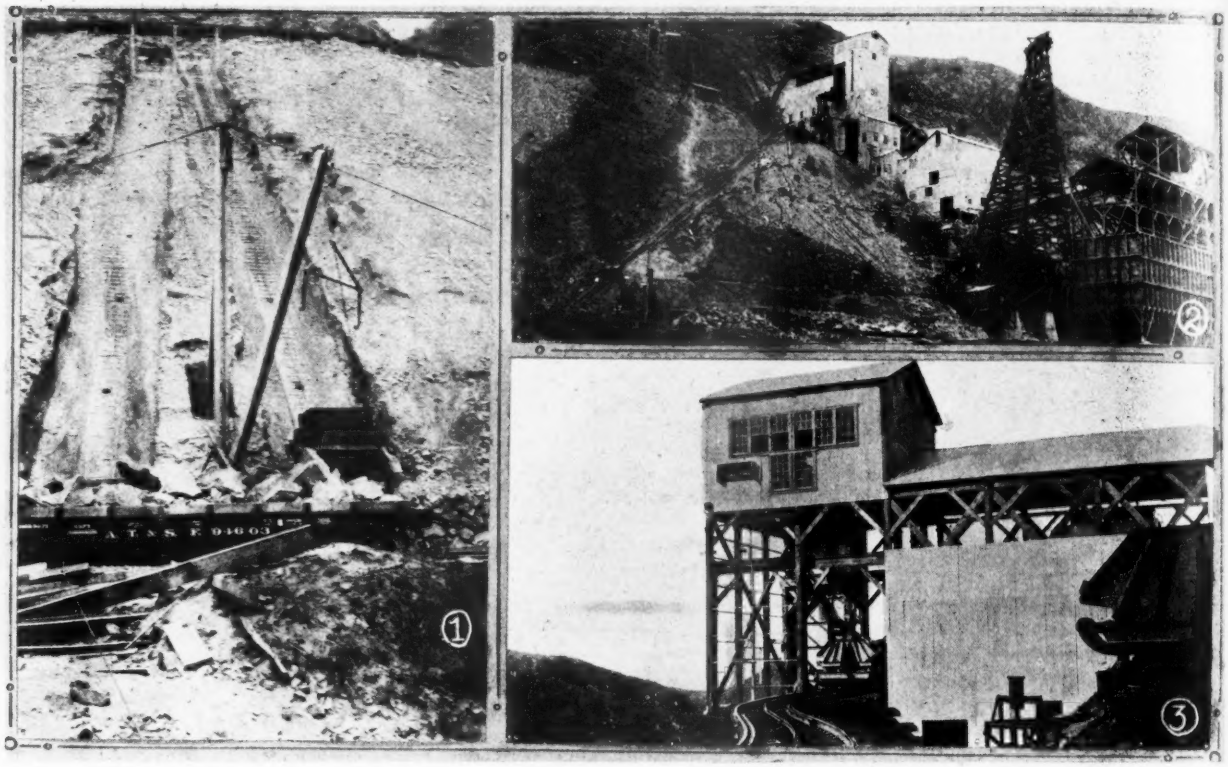
Car Storage

Two loading tracks are provided under the bins. These tracks are laid on a 1 per cent grade, and the tracks beyond the bins on the side of the mountain provide storage room for 60 standard gondola cars. Cars are moved out from

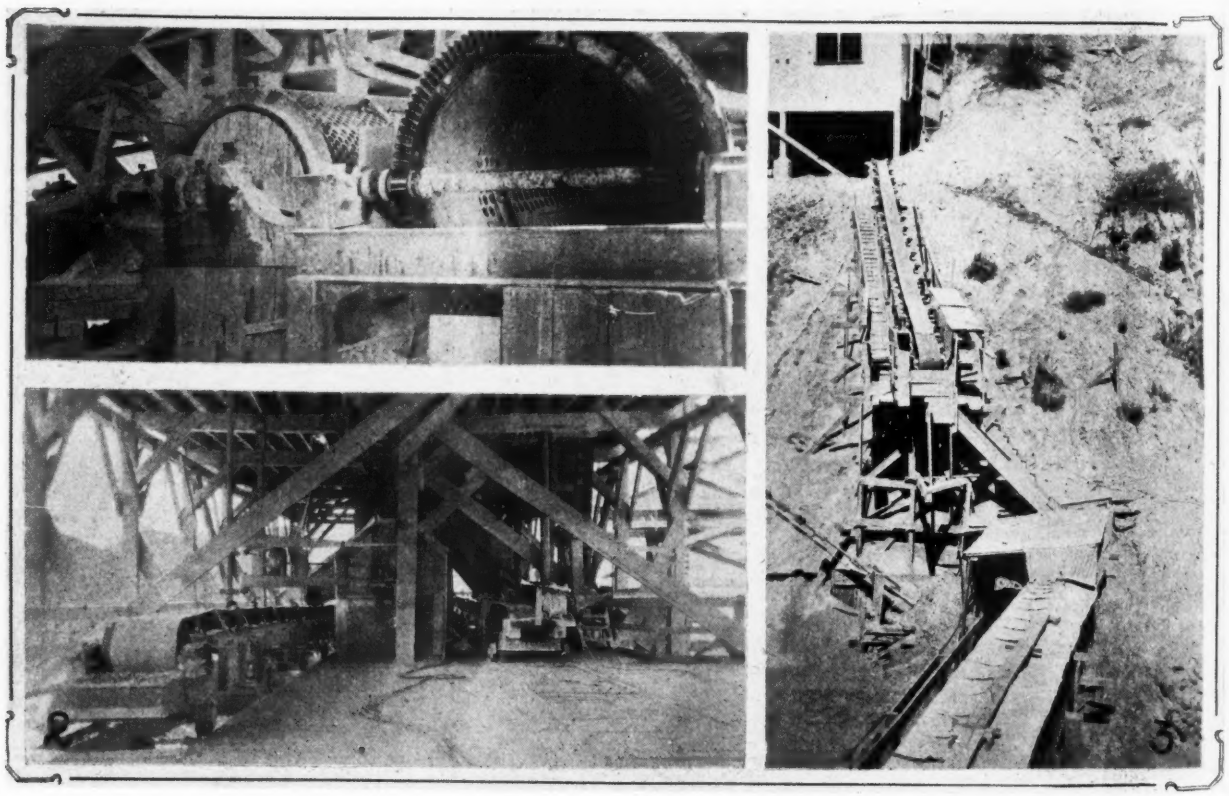
Crusher and Screening Plant Details of the Blue Diamond Plaster Co. Plant



View 1 shows the original scalping screen which is not now used; (2) The pair of scalping screens between the secondary crusher and the 48-in. disk rejection crushers; (3) One of the 48-in. disk rejection crushers; (4) The secondary crusher, No. 9 gyratory; (5) One of the belt conveyors from the No. 9 crusher to the two scalping screens



View (1) Cable-operated incline for loading out rip-rap; (2) General view of the plant from below; (3) Dumping level at quarry and operating tower for electric railway



View (1) Sizing screens; (2) Top of screening plant and bins showing shuttle conveyors; (3) Conveyor for removing fines that pass grizzly between No. 9 crusher and sizing screens

under the bins and for a considerable ways below the storage bins by gravity.

Railroad Facilities

The plant is on a spur track from a branch line of the Santa Fe Coast Lines. It has supplied the Santa Fe with a large amount of ballast and rip-rap. The rip-rap for closing the famous break of the Colorado River into the Imperial Valley, during President Roosevelt's administration, was all furnished from this quarry.

Electric Operation

The plant and all its appurtenances are driven by electric motors varying in size from 5 to 300 h.p. The total required is 1350 h.p. The rated capacity of the plant is about 4000 tons per 10-hr. day.

Management

The Blue Diamond Plaster Co. is now under the management of A. S. St. John, mining engineer of British Columbia. The cableway and cable incline features were designed and erected by the Lidgerwood Manufacturing Co., to the Los Angeles manager of which, Charles A. Baechtold, ROCK PRODUCTS is indebted for some of the views reproduced here. The others were taken by the editor on a recent visit to the plant.

Relative Wear of Different Pavements

THE BUREAU OF PUBLIC ROADS, United States Department of Agriculture, is making a study of the relative wearing qualities of different types of pavements and tests have been about completed on a short section of pavement containing 49 different types subjected to the wear of a special truck equipped with five large cast-iron disk-like wheels. The relative wearing qualities of hard as compared with soft brick are brought out very distinctly in this test. The resistance to wear of various kinds of stone block sections is also shown up to good advantage. A chance to compare grout and asphalt fillers for both brick and stone block is furnished by this investigation. Likewise, the relative wearing qualities of concrete when mixed with various kinds of coarse aggregates is indicated.

The investigation of subgrade materials started a few months ago with the co-operation of the District engineers and State engineers is proceeding at a very satisfactory rate. A number of samples have been received from various parts of the country and laboratory analyses of many of these samples are partially completed. The methods being used by the Division of Tests will shortly be published as a paper so that any other laboratories wishing to conduct similar investigations may have some guide as to the method of procedure being followed by the Bureau of Public Roads.

The samples analyzed have been taken from parts of the roads that have failed very badly as well as from adjacent parts of the same roads that have withstood heavy tariff successfully. It is hoped that by a comparison of the laboratory results on these samples with the reported behavior of the road in service differences in the subgrade materials will become apparent so that we will be able to say what physical characteristics soils must possess to give them high bearing value.

Tax on Materials Yields Revenue

DURING the fiscal year that ended August 31, 1920, the State of Texas received a considerable amount of revenue from its tax upon shell, sand and gravel taken from public waters. Most of this money came from shell, which is largely used for road construction in the Gulf coast region. A tax of $35,214 was paid on 704,291 yards of shell; while 19,584 yards used by counties and municipalities was free from taxation. A total of 228,706 yards of sand was used and yielded a tax of $10,968. Gravel used totaled 24,792 yards, on which a tax of $1,487 was paid.

ARTHUR Y. REED, president of the A. Y. Reed Gravel Co., Chicago and Elgin, Ill., has been eight years a sand and gravel producer. He began by opening the pit at Elgin and has been exploiting it ever since, gradually and

Arthur Y. Reed

consistently improving his plant, which was described May 22, 1918, in ROCK PRODUCTS.

Previous to becoming a sand man he was a hardware merchant in Elgin, where he dealt on the wholesale and retail plan. Although born in England, he was educated in this country in the "School of Life." He is also a farmer, being owner of the Elm Lawn Farm, four miles from the pit. Jersey Duroc hogs are his pets. His gravel plant also is a pet—he takes great pride in it.

Sand and Gravel in 1919

APPROXIMATELY 60,196 short tons of sand and gravel of all grades was sold in the United States in 1919, according to preliminary estimates made by L. M. Beach, of the United States Geological Survey, Department of the Interior. This quantity represents a decrease below that sold in 1918 of about 1,628,000 tons. The value in 1919, however, was $37,819,000 as compared with $37,927,079 in 1918, which shows that the average price had increased.

Magnesite in New Mexico

A DEPOSIT OF MAGNESITE that crops out on a steep hillside west of Ash Creek 2 miles above its junction with Gila River, about 30 miles north of Lordsburg, N. Mex., was recently examined by R. W. Stone, of the United States Geological Survey, Department of the Interior. The general alinement of the outcrops might indicate that it is a continuous body, 1,000 to 1,500 feet long and 30 feet thick, in limestone, but close examination shows that the limestone occurs as a number of detached blocks, none of them more than a few rods long, inclosed in granite and cut by dikes and sills of diabase older than the granite.

The magnesite has replaced certain beds of limestone, but at no place has it yet proved to be 30 feet thick, as at first indicated. At one place where the deposit has been prospected and has since caved there appears to be a total thickness of 20 to 30 feet of magnesite and limestone. The best exposure shows only 7 feet of magnesite in a limestone block 5 or 6 rods long, in which the beds stand vertical. Not all the limestone blocks contain magnesite.

The magnesite is hard, amorphous, and pure white, resembling the variety common in California. It is believed to have been derived from the diabase.

Pennsylvania's Highway Program Curtailed

DECENT announcements made by the Pennsylvania State Highway Department indicate that inability of contractors to obtain shipments denied them because of embargoes, and the allocation of open-top cars to transportation of coal are seriously hampering Pennsylvania's road construction program. Pennsylvania has 267 highway contracts in force at the present time, involving the construction of 993.29 mi. of highways.

Limestone That Can't Be Burned in Modern Shaft Kilns

Coarse Crystalline Stone Crumbles and Pulverizes When Calcined

MENTION WAS MADE in the article in describing the Courchesne lime kiln at El Paso, Texas, in ROCK PRODUCTS, July 31, of certain limestones that apparently can not be burned successfully in a modern shaft kiln. The limestone in the Santa Cruz district of California is a good example. This is one of the principal sources of supply of lime for the San Francisco market.

The views herewith show the old and the new lime plants of one of the prin-

Views 1 and 3 show how the lime crumbles and packs and must be removed by hand shoveling. 4. Drawing floor, kilns on the right. 2 and 5. Furnace and lime drawing doors and oil burners

cipal lime producers in the San Francisco district, only the new plant is the one the cursory visitor would no doubt take for a relic of by-gone days of the lime industry. For the four steel-jacketed shaft kilns with all modern improvements, shown in one of the views, are no longer operated, while the old style pot kilns are, and some of these old style pot kilns have been added since the shaft kiln plant was built—which tells the story.

The pot kilns used here are not the continuous-fired draw kilns, such as those at El Paso, but the crudest type of kiln. They are approximately rectangular in plan, possibly about 24x12 ft., with rounded corners. They are lined with firebrick and are fired with oil burners.

To start the kilns a cribbing of fire wood is laid on the floor of the kiln. The kiln is then filled to the top with chunks of limestone, and the calcining started by igniting the wood fuel. Then the oil burners are used to finish the job. The crude oil fuel is vaporized with steam at about 100 lbs. pressure. There are two burners to a kiln.

The kilns are comparatively shallow—about 10 or 12 ft. In order to prevent excessive waste of heat they are covered over the top with rough plates of sheet steel as one of the views shows. It takes approximately 24 hours to burn the kiln of stone.

As the stone is calcined the lime crumbles and eventually fills practically all the interstices between the lumps. Some idea of what happens in the kiln can be obtained from views 1 and 3, which show how they have to be "drawn." The lime is so compacted that it must be removed with pick and shovel.

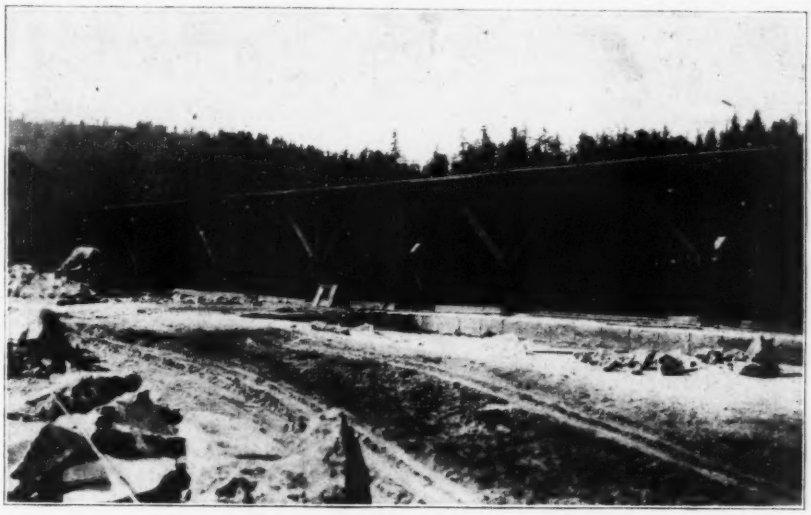
The lime produced is a very high calcium, high grade quick lime, but this method of burning obviously entails considerable loss, and presents a problem, which can apparently be solved efficiently only through use of a rotary kiln.

Rotary kilns are very successfully used on a very similar limestone to that at Santa Cruz, at the plant of a prominent Southern California lime producer, at Colton, Calif. At this plant oil burners, with water vapor (a mixture of compressed air and water) for atomizing the oil, are also used and a high calcium quick lime remarkable for its purity and keeping qualities is produced.

Crushed Rock Needed in Minnesota

THE PROPOSED road-building program in Minnesota this year will require about 667,000 tons of crushed rock or gravel, according to information secured by the Bureau of Public Roads, United States Department of Agriculture. These figures give some idea of the magnitude of the road-building program.

Modern shaft kiln lime plant abandoned in favor of old style pot kilns



Charging level of old style pot lime kilns

Kiln in foreground with charge "burning"

Limestone Quarry and Shale Mine

The Dixie Portland Cement Company Gets Its Raw Materials from Mountain Above Plant

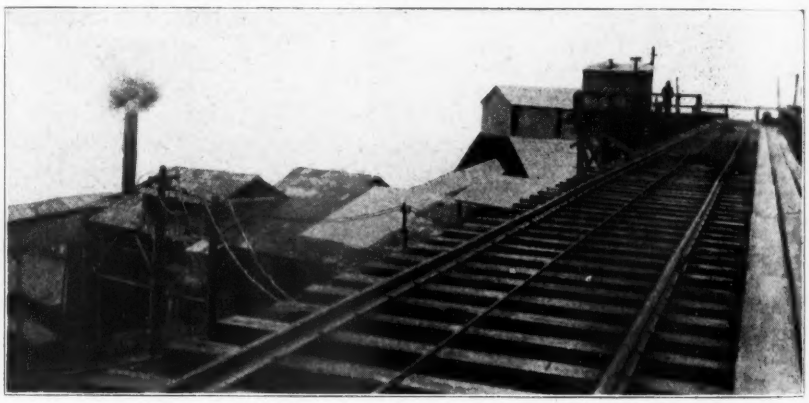
THE DIXIE PORTLAND CEMENT CO., whose plant is at Richards City, Tenn., and which is one of the oldest and best established cement manufacturers of the South, obtains both the limestone and shale used in its operation from the mountain side high above the plant. This enables the flow of the material to be a natural gravity process and eliminates many of the mechanical devices found in other plants.

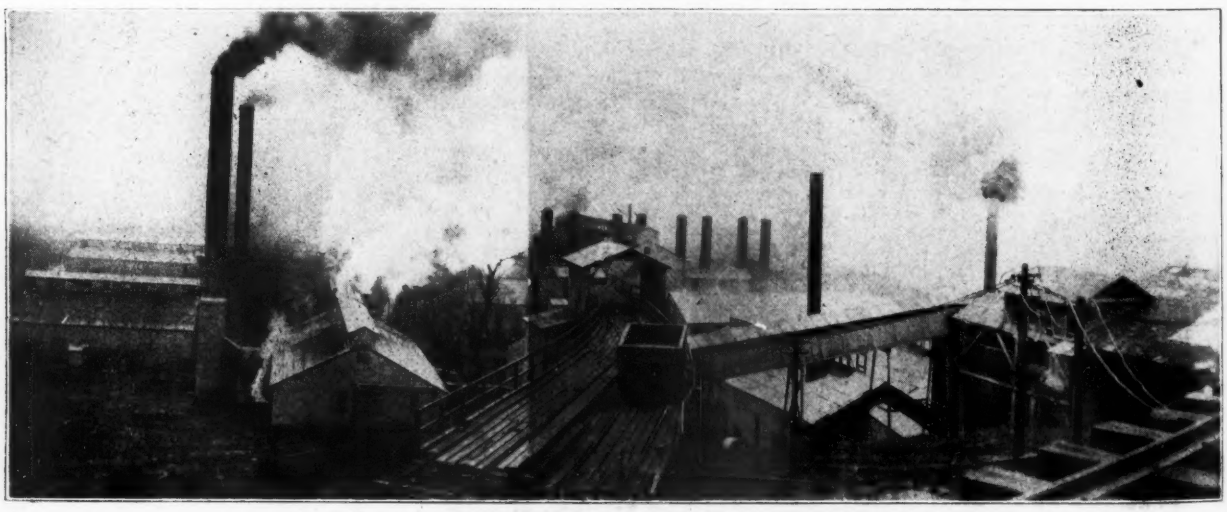
The mix is controlled by the wet process and the raw material is shale and limestone. The shale is obtained from a drift mine 400 ft. above the plant. The mining of shale is almost the same as the mining of coal except that greater care must be taken. It is found that after having been exposed to the air for a certain length of time, the shale will disintegrate and in time the ceiling will cave.

Shale Mining

The entries are driven into the mountain and rooms are worked off either side. At frequent intervals of time they must be tested by hammers in order to determine how loose the ceiling has become. Experience has enabled the workmen to tell when there is danger and then the room must be abandoned and another opened. The entries are protected by supports. The time that a ceiling will stand is not constant, for sometimes the rooms are worked out quite large before they must be left and again in several weeks others will become unworkable.

This condition makes necessary a very careful and continual survey of the mine.





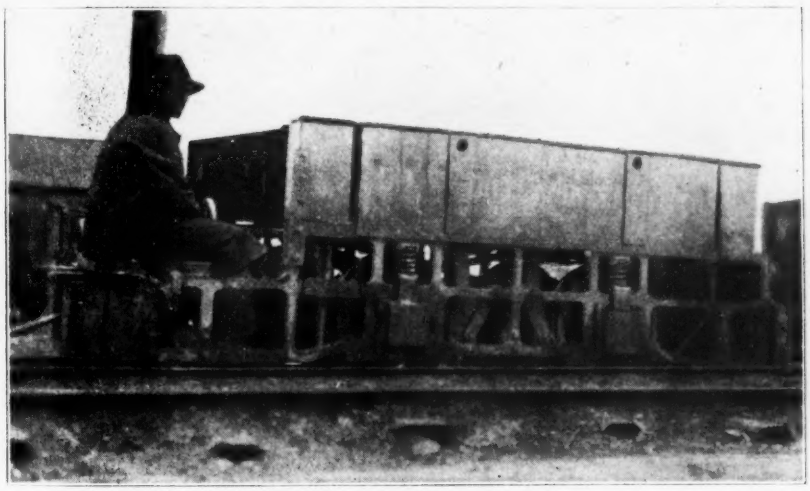
Mine and mill of the Dixie Portland Cement Company, Richards City, Tennessee

Each new room that is opened is immediately located on the map so that there will be no possibility of opening another room which will lap into one that has been abandoned.

The material is drilled, blasted, loaded and transported very much the same as in any mine. The type of car used is shown in one of the views.

Immediately outside the mine and just below it, so that material may be delivered to it, is a large hammer mill which reduces the shale to 1½-in. This is again lowered by gravity into a storage bin.

Cars used in shale mine of cement plant



Electric mine locomotive for shale cars

Special car for incline to cement plant

Special Cars

A car of special construction is used to lower the material from the storage bin to the plant proper. One of the views shows this car at the hopper receiving a load. Because of the very steep grade down to the plant, the body of the car is built on such an angle that while on the grade the top of the car is practically level. This greatly increases the capacity of the cars.

At the plant the cars come in on a trestle which is above the storage bin and the cars are bottom-dumped into them. The view shows the lever by the means of which the bottom is released.

A description of the quarry at this plant was given on pages 22 and 23 of the April 24 issue of Rock Products in an article describing the recent large blast at this plant. This limestone is also 175 ft. above the plant and its face of 135 ft. is blasted down and loaded by a steam shovel into side-dump cars and lowered to the cement plant in the same way as the cars from the shale mine.

The cars are elevated back to the mine and the quarry by cables and hoisting engines which are also used to regulate the speed while the cars are on their downward trips.

Owing to the fact that the quarry is above the plant it is not necessary to elevate the stone until it has been completely pulverized. A big gyratory crusher is mounted on the mountain side so that the cars coming out on a trestle-way can empty into the top without their being elevated. The product of the crusher is again fed further down to the plant by gravity.

The president of the Dixie Portland Cement Co. is Richard Hardy of Chattanooga, Tenn.; the vice-president, C. W. Miller, of Ann Arbor, Mich.; the treasurer, Wellington Barnes; the secretary, George Kilian, both of Chattanooga, the sales manager, J. H. Dalbey, and the superintendent, W. H. Klein, of Richard City, Tenn.

Community Storage Bins for Agricultural Limestone

UNDER the title above, the Jeffrey Mfg. Co., of Columbus, Ohio, has issued a very useful bulletin on the storage of limestone for agricultural purposes. This idea is spreading very rapidly and already several county farm bureaus in Ohio, Indiana and Missouri have been particularly active in promoting the storage of agricultural limestone. This is the one factor in agricultural lime and limestone promotion necessary to assure the wonderful future in store for these commodities.

The Jeffrey Mfg. Co. has reproduced several plans in the booklet and will furnish to those who specify Jeffrey equipment, complete working drawings and specifications for the erection of storage bins.

Hints and Helps for Superintendents

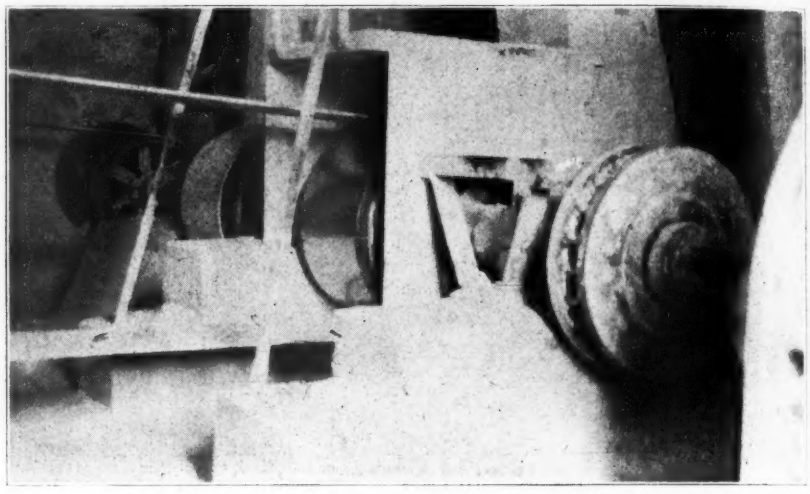
Compact and Well Balanced Layout for Crusher Drive Shaft

THE ACCOMPANYING VIEWS and diagram illustrate the compact arrangement of the crusher drive at the Weston and Brooker Co., Columbus, S. C., and also a design which balances the horizontal thrust of the shaft.

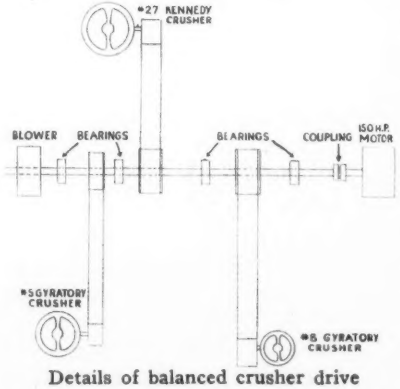
The crushing units consist of a No. 27 gyratory crusher, and a No. 7 and No. 5 gyratory recrushers. All of these crushers are driven from one shaft which is direct connected to a 150-h.p. motor. The shaft of the motor is fastened to the crusher drive shaft by a flexible coupling and the crushers are alternated. That is, the shaft is between the crushers; the No. 27 being on one side and the smaller crushers on the other. Thus as the shaft rotates the horizontal thrust caused by the initial crusher is counterbalanced by the thrust in the opposite direction of the two smaller crushers.

At the end of the shaft there is a blower which draws the air from around the crushers removing with it all of the fine dust made in crushing. This keeps the mill quite clean and entirely free from dust. The blower is the idea of W. S. Weston, secretary and general manager of the company. The removal of this dust is important because the stone crushed is granite, and granite dust is not good stuff to breathe, and it is hard on machinery bearings, etc.

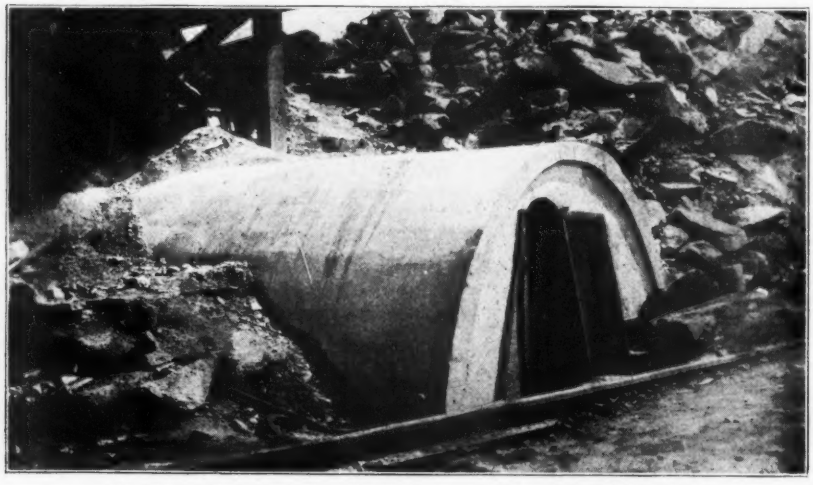
The motor and the entire shaft is housed in concrete so that it is both dust and damp proof. This arrangement is claimed to have the following advantages; it is very compact, the alternation of drives saves power in that it eliminates a thrust, the shaft is easily accessible for inspection and oiling, and there is no danger of an ordinary workman coming in contact with it.



Balanced crusher drive at Weston and Brooker plant



Details of balanced crusher drive



Dust-proof concrete housing of motor and crusher-drive shaft

Operation of Motor-Truck Fleets

ORGANIZATION is just as essential to the efficient operation of a group of trucks as it is to any other phase of business activity. Only by means of an organization can a fleet owner or manager direct the operation of his trucks intelligently and economically.

The personnel of a fleet organization is divided into two groups, one of which is the maintenance division, and the other the operating division. In some of the larger fleet organizations, an inspection division has separate identity, but in the smaller ones this inspection service is directed by the maintenance division, or is performed by the truck manufacturer himself.

The maintenance division should be headed by a superintendent who is a practical mechanic. He may have as many assistant mechanics as is necessary to maintain the fleet is good mechanical conditions. Washers and greasers are included in his department, and work according to a well-planned schedule.

The operating division should be headed by a man who is a practical dispatcher. He usually has direct charge of the drivers, who report to him daily as to mileage traveled, work accomplished, etc. The head of this division should furnish the fleet owner or manager with weekly or monthy record reports, showing the performances of each truck in complete detail.

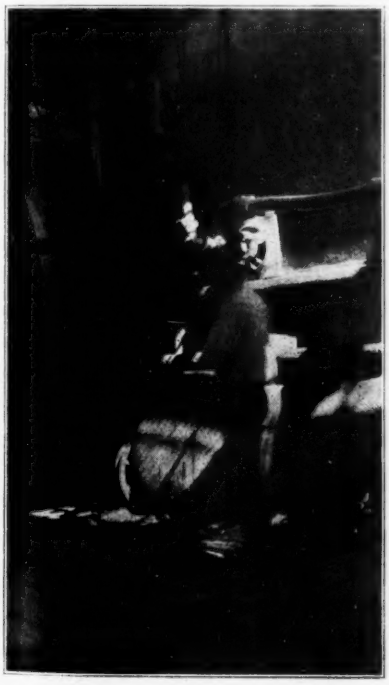
The larger fleets usually require a stockroom for spare parts, unless the manufacturer's service station is close to the base of operation. Fleets of less than 10 trucks seldom need a stock of parts, except for minor ones, such as spark plugs, fan belts, grease cups and the like. The larger fleets require in addition extra springs, bearings, valves, magneto parts, etc. Some of the larger fleets use the unit system, keeping on hand a spare motor, transmission, rear axle and other units in addition to sets of springs and other essential parts. — Furnished by Pierce-Arrow Motor Car Co.

Sampling Cement Clinker

THE RIVERSIDE PORTLAND CEMENT CO., Riverside, Calif., makes hourly tests of its clinker. But these tests are not made of the clinker as it goes to storage or to the grinding mills, but from clinker taken red hot from the kilns.

Every hour an employee of the laboratory makes the rounds of the kilns with a tray of crucibles, numbered for each kiln. A sample of clinker is taken through an opening in the kiln under the oil burners by means of a long-handled iron ladle.

These hourly samples are tested immediately by the kiln-room foreman for the lime content and then in the laboratory for the usual control factors. This gives the closest possible control of operation as the kiln feed is readily changed. The dry process of manufacture is used and crude oil is the fuel.



Sampling cement clinker, red-hot from the kilns

Daily Report of Quarry Operations

FOR CONTROL OF OPERATIONS of a single quarry or plant it is doubtful, in the opinion of most operators, if much is gained by daily cost reports. Weekly reports are generally considered sufficient and in many cases monthly reports. With small plants and single operations close personal supervision and personal knowledge of what is going on are undoubtedly more effective than daily reports of any kind.

With a company operating many plants and maintaining a general sales organization for a large territory, of course daily reports are almost a necessity. The blank form below is that of one of the country's largest quarry operators and shows in detail the character of the data collected.

However, it should be emphasized that such a daily report is practically valueless as a basis for adoption of selling price. No experienced quarry operator uses it for such a purpose. It is purely a help to be used for control of operations and as an aid to the selling organization in showing what sizes and how much are available for shipment.

To make adequate comparison of one day's unit cost with the next, or of one plant's unit cost with that of another, it is of course necessary to divide the unit cost into a constant or fairly uniform overhead expense, and an operating cost, dependent entirely on the volume of production.

It is failure to make this distinction and the basing of selling prices on averaged daily, weekly or monthly costs which leads to so much underselling and failure to make both ends meet. These particular quarries have a practically uniform price throughout the year, based on their whole experience in cost of production and their very best judgment as to what costs will be for the ensuing year.

FORM 100

DAILY OPERATING REPORT REPORT NO._____

FROM_____ PLANT NO._____ DATE_____

SIZE NUMBER	TONS CRUSHED, INC. TONS STORED	TONS STORED STOCK	TONS LOADED FROM STOCK	TONS SHIPPED, INC. TONS SHIPPED FROM STOCK
1				
2				
3				
4				
5				
6				
7				
ROOFING SLAG				
ROUGH SLAG				
TOTAL				
TOTAL TO DATE				

CRUSHING

	LABOR	REPAIRS & SUPPLIES	TOTAL	COST PER TON	NO. MEN EMPL'D	HOURS WORKED	HOURS RUN	HOURS DELAY	CAUSE OF DELAY
TOTAL									
TOTAL TO DATE									

REMARKS—CRUSHING:

DRILLING

DRILL NO.	LABOR	REPAIRS & SUPPLIES	TOTAL	FEET DRILLED	COST PER FT.	HOURS WORKED	HOURS RUN	HOURS DELAY	CAUSE OF DELAY
TOTAL									
TOTAL TO DATE									

BLASTING

	LABOR	REPAIRS & SUPPLIES	TOTAL	TONS SHOT	COST PER TON	FT. DRILL'G USED IN SHOT	REMARKS
BLAST'S							
PLUG'RS							
TOTAL							
TOTAL TO DATE							

STRIPPING

	LABOR	REPAIRS & SUPPLIES	TOTAL	YARDS STRIPPED	COST PER YD.	HOURS WORKED	HOURS RUN	HOURS DELAY	CAUSE OF DELAY
TOTAL									
TOTAL TO DATE									

SIGNED_____

Daily cost report blank of large quarry organization

Sand and Gravel From the Platte River at Denver

Unusual Operation of the Platte River Sand and Gravel Company on Historic Colorado Stream

THROUGH THE PRAIRIE COUNTRY of Iowa and Nebraska river sand and gravel operations are a common sight, and they are nearly all dredging operations of one kind or another. But farther west they develop into an entirely different type of operation, of which that of the Platte River Sand and Gravel Co. at Denver, Colo., is more or less typical.

The Platte River is famous in the history of the pioneer days of the West. It comes down out of the Rocky Mountains near Denver and rambles over the plains of Nebraska to the Missouri. Its fords in Nebraska during the prairie schooner days used to be far-famed for their treacherous quicksands.

After it leaves the mountains near Denver, the Platte River contains a practically inexhaustible supply of sand and gravel, which is continuously being deposited. Also, it flows out of the mountains into a plain that is largely built up of previous deposits. A good idea of the character of these deposits can be had from the accompanying view, which was taken from the top of the washing and screening tower.

View of the Platte River sand and gravel deposit at Denver, from top of plant

Clamshell excavator for working the Platte River gravel deposits at Denver, Colo.

Stripping these deposits is no simple task, owing to the timber on them. But this timber is saleable and will about pay for the cost of the stripping, according to some recent experience of the Platte River company.

Like many Western mountain streams the Platte River carries a small amount of gold, and in the old days considerable placer mining was done among its sand and gravel deposits. F. C. Wilson, general superintendent of the Platte River Sand and Gravel Co., for his own amusement, has panned out enough gold dust in the river at the site of the plant to show "color."

At present, however, all the gold that comes out of the Platte River is in the form of profits from the sand and gravel operation. The presence of gold in these gravels, however, is interesting, and doubtless the day will come when an effort will be made to recover it, as a sand and gravel plant by-product. The same applies to many similar streams in the Far West, and in a succeeding issue of ROCK PRODUCTS an actual operation of this kind will be described.

Orange-Peel Excavator

The present mode of operation of the Platte River Sand and Gravel Co. is excavation by an orange-peel bucket, driven from a traveling crane or tractor derrick. This machine travels along the bank of the stream on a timber cribbing and loads the material into cars on a narrow-gage steam-dinkey operated railway.

The cars are dumped into a hopper and the material elevated by a bucket elevator to the top of the screening and washing tower, where a single cylindrical screen with jackets makes the separation into sand and gravel.

The sand drops below into sand-settling boxes and then to bins, while the stone and gravel are separated into commercial sizes and over-size. The over-size is chuted to a detached bin, from which it is fed out into a small jaw crusher. From this crusher the material is elevated and chuted direct to cars without intervening storage, as the crusher is only operated intermittently.

The president of the Platte River Sand and Gravel Co. is C. S. Lambie, one of the most prominent construction contractors of Denver. He went into the sand and gravel

business originally largely to supply his own needs for concrete aggregates, and the sand and gravel business has hardly ever been more than a sideline to him. Nevertheless this plant is one of the largest commercial plants in this territory. It has a capacity of about 300 cu. yd. per day and has unlimited opportunity for expansion.

Platte River Sand and Gravel Used in Nebraska

THE PLATTE RIVER runs through the central part of Nebraska and for ages it has been rolling down the feldspar and quartz rocks from the Rockies and depositing them. In many places this material is pumped up, screened and graded, and makes splendid aggregate for concrete. The material in question, however, violates a favorite condition that engineers have made a part of their fine aggregate specifications: that the particles must be sharp. This theory has been proven fallacious, for the rounded particles, if they are clean and hard, have been found to develop more strength than the sharp variety.

The material pumped up from the Platte River has another characteristic that has caused engineers to be cautious, that is its fineness. One who is familiar with Prof. Abrams' tests, knows that he has developed a theory that if a material shows a certain modulus of fineness, depending upon its grading, this material may be composed of any sized aggregate. Even the grading is relatively unimportant in comparison with water content.

Tests of Platte River Aggregate

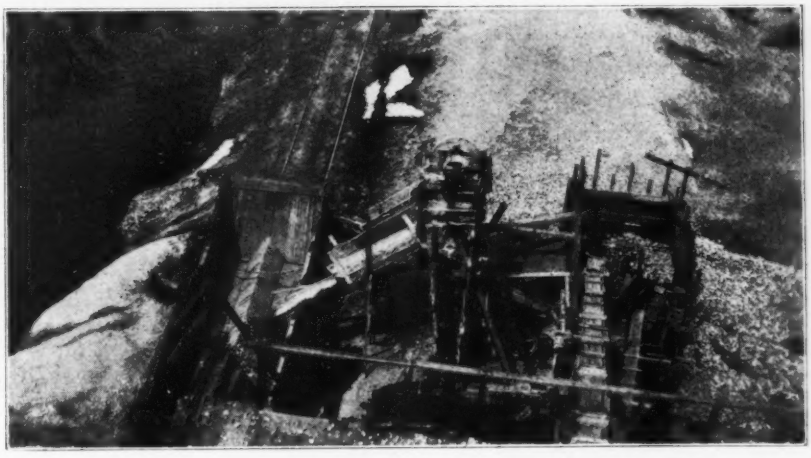
With this theory in mind, it was decided to send a sample of the Platte River material to the testing laboratory of the Bureau of Roads, Department of Agriculture, Washington, determine whether so-called Platte River gravel would meet with their approval for use on concrete paving work in Nebraska. This matter was an important one as it meant utilizing the greatest supply the state has for paved roads. The analysis of the sand-gravel mixture was as follows:

Passing ¾-in. mesh screen and retained ½-in. screen	2.0
Passing ½-in. screen and retained ¼-in. screen	12.7
Passing ¼-in. screen and retained ⅛-in. screen	85.5
Retained on ¼-in. screen.....Per cent.	14.7
Passing ¼-in. mesh retained on 10 mesh	44.4
Passing 10 mesh retained on 20 mesh	27.9
Passing 20 mesh retained on 30 mesh	5.5
Passing 30 mesh retained on 40 mesh	3.1
Passing 40 mesh retained on 50 mesh	1.3
Passing 50 mesh retained on 80 mesh	1.9
Passing 80 mesh retained on 100 mesh	0.2
Passing 100 mesh retained on 200 mesh	0.5
Passing 200 mesh	0.5
	100.00
Loss by washing silt and clay	0.4

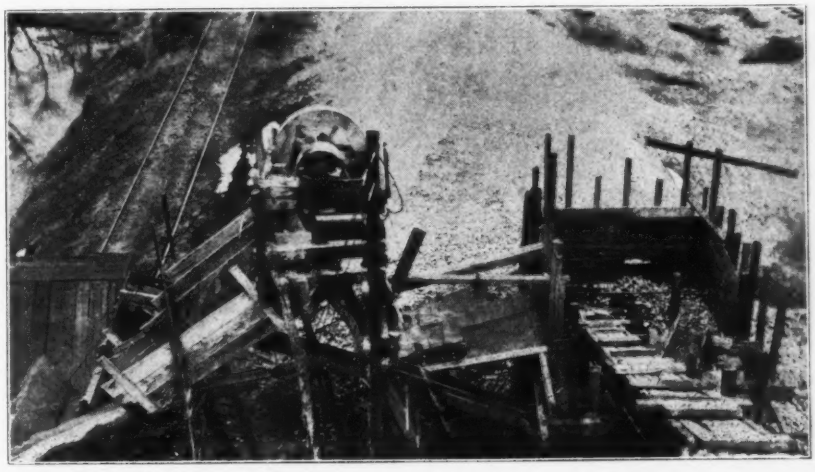
The sample consisted essentially of rounded fragments of granite, quartz quarzite, with a large amount of subangular quartz sand.

The average unit crushing strength of the Platte River sand-gravel concrete was 2,198 lb. per square inch. The average unit crushing strength of the Potomac River gravel concrete was 2,050 lb. per square inch.—A. S. Mirick, in the "Cornell Civil Engineer," Cornell University, Ithaca, N. Y.

Plant of the Platte River Sand and Gravel Co.



Gravel crushing arrangement at Platte River plant



Another view of boulder and gravel crushing and loading scheme

Blasting Granite with Compressed Air

Method of Blasting Granite Deposits at Lithonia, Ga.

By Oliver Bowles, Mineral Technologist,
U. S. Bureau of Mines

THE INTRODUCTION INTO MINES, quarries and manufacturing plants of machines and tools operated by compressed air has revolutionized methods of operation to an extent comparable only with that occasioned by the invention of explosives and the utilization of electricity. The use of compressed air in pneumatic tools, in rock drills, and for the operation of pumps and other machinery is well known to most miners and quarrymen, but its application as a substitute for explosives for breaking rock in a few granite quarries has received little publicity.

Lithonia Marble Deposit

In the region of Lithonia, a few miles from Atlanta, Ga., is a dome of massive granite used widely for building stone and for paving blocks. The most remarkable structural feature of the granite is the absence of joints and sheeting planes. The term "joints" is applied to open fractures that commonly occur in rocks, usually vertical in direction or nearly so, and spaced from a few inches to several feet apart. On the Lithonia granite outcrop, however, one may walk over the bare rock surface for hundreds of feet without finding any indications of a joint. "Sheeting planes" are open fractures at various levels, approximately parallel with the rock surface. The presence of such planes when spaced several feet apart greatly facilitates quarrying, and where absent, as at Lithonia, the necessary fractures must be made artificially.

Artificial Sheeting Planes

The forcing of artificial sheeting planes is accomplished as follows: Two holes of about three-inch diameter are drilled close together and to a depth of about eight feet. Two men work at these holes all summer, and sometimes part of a second summer. A very small charge of black blasting powder, not more than a spoonful, is placed in each hole, tamped with clay, and the charges are fired simultaneously with an electric battery. This starts a small fracture running outward from the bottoms of the holes. There is in most granites one direction of easy splitting known among quarrymen as the "rift," and as the rift direction in the Lithonia granite is horizontal the fracture follows a horizontal plane.

After this preliminary shot water is poured into the holes to soften the clay tamping which is then removed, and second charges, a little larger than the first ones are placed in the same holes. This process is repeated time after time with a gradual increase in the size of the charges, and the fracture gradually widens. A quarryman skilled in this type of work can readily judge the extent of the fracture, for when standing on the rock surface at some distance from the drill holes he can determine by the nature of the jar beneath his feet when the charges are fired whether or not the fracture has reached the point over which he is standing.

Heat Aids Process

Solar heat is said to assist greatly in this process. It is claimed that during the hottest part of the summer the fracture will extend without the assistance of explosives. In fact solar heat is found to be of such material advantage, that it is deemed advisable to suspend operations during the winter months.

There is nothing spectacular about this type of blasting, for the charge is never large enough to disturb the tamping. If one places his ear on the rock surface at a distance of 25 or 30 feet from the drill holes the only evidence of the explosive discharge is a faint thud similar to that produced when one rests his head on a table and taps the under surface of the table top with his finger tip.

This process of blasting with increasing charges is continued until the outward boundary of the horizontal fracture forms a circle 60 to 80 feet distant from the central holes. Any attempt to hasten the operation by increasing the charges too rapidly would be disastrous, for it would result in forcing a vertical fracture, and thus render further continuance of the process impossible.

Use of Compressed Air

The final step, involving the use of compressed air, is the most interesting of all. An iron pipe is placed in each drill hole, and the space between the pipe and the rock filled is with sand bags and melted sulphur so that it is air tight. Connections are made from the iron pipes to the air compressor equipment which is employed to supply air to the quarry drills, and compressed air is thus transmitted at a pressure of about 100 pounds to the square inch. The effect is truly remarkable, for as the air enters the narrow confines of the artificial sheeting plane, with a cracking rending noise it widens the fracture until it emerges at the surface at some point on the flank of the rock dome. The sheeting plane thus formed may cover an area of one or two acres.

At first sight it seems incredible that air at a pressure of only 100 pounds per square inch could execute so tremendous a task. A little calculation, however, will make it seem more reasonable. Assuming that through leakage or for other reasons the air pressure drops to 50 pounds per square inch, the total upward pressure on a circular mass of rock 120 feet in diameter would be over 40,000 tons while the actual weight of such a mass of rock 8 feet thick would be only about 7,200 tons. Thus the lifting pressure would be nearly 6 times the weight of the rock mass, and this is evidently sufficient to force a continuance of the fracture already begun with explosives.

The mass of rock 8 feet thick and one to two acres in extent is then ready for subsequent quarry operations, and one such mass may occupy workmen for an entire season. Cross fractures are made by using "plug and feather" wedging in holes 5 inches apart and 5 inches deep. Masses of rock about 8 feet wide, 8 feet thick and many feet long are first broken out, and these are subsequently further divided.

The absence of joint planes makes it possible to procure rock masses of any desired size. One mass observed was 8 feet thick, 7 feet 8 inches wide and 375 feet long with no cross fractures. Such a mass would weigh about 1,870 tons. In so far as utilization of the product is concerned any possible advantage to be gained by the ability to obtain exceedingly large block is entirely lost, for most of the rock is subdivided and again subdivided until it is reduced to building stones and paving blocks.

The employment of compressed air in breaking rock in the manner described does not bear promise of any radical change in general quarry practice, for its application is greatly restricted. Most rock ledges are intersected by numerous joints which in many instances are so closely spaced that blocks suitable for building or paving cannot be obtained, and the rock may be utilized for crushing purposes only. It is obvious that any open fracture in a rock mass would provide a means of escape for the explosive gases generated during the early phases of the process described above, and thus render it ineffective, and would also permit the escape of the compressed air used in the final operation. Thus the method may be used only where the rock is free from joints, and such rock masses are of rare occurrence.—U. S. Bureau of Mines, Reports of Investigations.

Properties of Talc and Soapstone

Testing Physical and Chemical Properties

By Raymond B. Ladoo
Mineral Technologist, U. S. Bureau of Mines

THE USES for which ground talcs are suited closely depend upon their physical and chemical properties, but, in spite of this fact, little scientific investigation has been made in order to devise quick and accurate tests for the determination of these properties. The chemical properties of talc are inherent and may not be altered or modified except by selective mining or by chemical processes not practical in the present status of the industry. However, the determination of chemical properties is not so important, for most uses, as of physical properties, although sometimes certain chemical characteristics are perhaps unduly insisted upon by chemists in some industries. Physical properties are dependent both upon mineralogical characteristics and upon methods of grinding and sizing and may thus be partly changed or modified by changes in practice.

There is so little known of the chemistry and physics of the various processes in which talc is used that the purchase and sale of talc is governed more by rule-of-thumb methods dependent upon individual opinion and often, prejudice, than by accurate, standard tests. This not only causes unwarranted price fluctuations, but injures both the producing and consuming industries by creating false ideas of the suitability of talc for various uses. It thus seems important that present tests be standardized and made uniform for the whole industry, and that new tests devised to fill the existing gaps.

Physical Tests

Some of the important physical properties are (1) Size of grain; (2) shape of grain; (3) hardness; (4) color; (5) slip; (6) specific gravity; (7) grit-size, nature, and percentage of oversize; (8) absorptive power, and (9) behavior under heat.

(1) *Size of grain.* The importance of knowing accurately the average grain size is now generally recognized, although a few producers still make no sizing tests. The most efficient plants use a series of standard wire screens ranging up to 200-mesh and one uses a 300-mesh screen. As the approximate fineness of the talc to be tested is usually known, only one screen is customarily employed, although for accurate sizing of non-uniform material a series of screens is needed. The 200-mesh screen has been generally adopted as the governing screen for most finely ground talc. A definite quantity, 10 or 20 grams, is carefully weighed out and placed on the screen. Several methods of forcing the talc through the screen are in use. It may be shaken or jarred through, rubbed through with the fingers or forced through by a fine water spray. The first method is the most common, but it is very slow for fine material; the second method, rubbing, is only useful as a rough, quick test, for the rubbing action not only wears out the screen but stretches the wires apart so that the sizing is not accurate. The water spray method is not generally known, but is one of the best methods in use. A nozzle, which will fit on an ordinary water faucet, designed to produce a very fine spray, is used. The screen upon which the talc is placed is slowly passed under the spray, all the fine material being rapidly washed through. The screen is then placed on a warm plate or steam radiator to dry. When thoroughly dry the residue is brushed on to a paper and transferred to a balance pan for weighing. The spray method, although slightly slower than the shaking method, is less tedious and is very satisfactory. When screens are used it is not sufficient to state merely the screen mesh when reporting tests, as different screen makers use different sizes of wire with consequent differences in size of opening. To be strictly accurate, the size of the screen opening should be expressed in fractions of an inch or in millimeters. The adoption of a set of standard screens by the whole talc industry would be highly desirable.

The most accurate method of obtaining grain size is by actual measurement with a microscope equipped with a micrometer eye piece. The average of a number of measurements gives a close approximation to the average size of particle. This method is not now used commercially, but is very useful.

(2) *Shape of grain.* No tests are now made commercially to determine the shape of talc grains, although this undoubtedly has a very important bearing upon uses. The predominant shape may be round or flat, needle-like or lath shaped, smooth or irregular. One grain shape may be best for paint, another for paper, and another for rubber. The determination of grain shape may be made readily with a microscope, and may have a very important application.

(3) *Hardness.* The hardness of crude talc is often roughly determined by scratching with the fingernail, a knife, or a coin, but no tests on the hardness or abrasive action of powdered talc are made. Hardness may be an important factor for some uses; for example, in lubricants and polishing agents and as a filler for phonograph records, but no tests for the determination of the hardness of ground talc have been devised.

(4) *Color.* A very pure white color is insisted on by many consumers of talc, but as yet no standard, accurate method of detecting slight differences in color has been devised. Practically all talc producers make a rough comparative test by the unaided eye, but the human equation enters very strongly into the results. Talcs are usually compared with a sample taken as a standard, but differing for each producer and consumer, the talc being either placed in little heaps or spread out flat with the finger or a knife, on the hand or on blue or white paper. Flattened heaps on blue paper in white light give the best results, but even this method is not satisfactory, as no standard samples are used in common by the whole industry and differences in light and in the human equation produce varying results. The importance of accurate determination of slight color differences is often great, for color is not only an index of value, but also it is often an indicator of proper methods of grinding. Poor color is not always due to impurities, but may be due to insufficient or improper grinding. In one instance a yellow color in a talc was attributed to iron, but a microscopic examination proved that finer grinding would eliminate most of the objectionable color. Finer grinding of many talcs improves the color. A uniform and standard method for the determination of color should be devised and adopted.

(5) *Slip.* Slip is a term applied to the relative smoothness or greasiness of ground talc. Good slip is desirable for some uses and unimportant or even objectionable for others. Slip is ordinarily roughly determined by rubbing the talc between the fingers or in the palm of the hand. This test is very rough and is of little value in the accurate comparison of talcs. A method of uniform testing of slip would be very desirable.

(6) *Specific gravity.* The specific gravity of pure crude talc varies from 2.55 to 2.78, but the apparent specific gravity of ground talc, as indicated by its behavior in water, oil or other liquids, varies between much wider limits. This is due to the facts (1) that other minerals often occur with talc and are ground with it, (2) that grains of different shapes have different rates of settling in liquids, (3) that very finely

ground talc has colloidal properties which tend to keep it in suspension in liquids. Some paint manufacturers desire a heavy talc which will sink in water and others demand a flaky or fibrous talc which has a tendency to stay in suspension and not cake down solidly. Some of these differences are due to differences in specific gravity and some to shape and size of grain, surface tension, etc. It would be very desirable, therefore, to devise uniform methods of determining not only the specific gravity but also the other properties that affect the behavior of talc, both as a dry filler and in liquids. No such tests are now in use.

(7) *Grit: Size, nature and percentage of oversize.* The presence of grit or oversize in ground talc is objectionable for most uses. Sometimes the grit is a siliceous or other impurity and sometimes it is merely insufficiently ground talc. In some products siliceous impurities would be very harmful, whereas oversize talc would not be objectionable; for example, in lubricants. In other products, oversize of any nature and siliceous impurities, even if finely ground, would be injurious; for example, in paper manufacture. It is, therefore, important to know the size, nature and amount of grit or oversize present in ground talc. The screen tests previously described may be used to determine the amount of oversize, but the nature and size can only be determined under a microscope. If the grit is siliceous and not oversize talc its presence can be detected by "gritting" between the teeth or by rubbing between the finger nails. This method is a crude one and does not determine the nature, size, nor relative amount present. Another method in use is to flatten out a small pile of talc, so as to present a smooth surface, by pressing or rubbing with a piece of plate glass. This method will detect only coarse impurities present at or close to the surface of the pile. There is, then, no test or series of tests now in use which enable accurate and uniform determinations of this property to be made. A careful microscopic examination is of great assistance, but is not wholly satisfactory for this purpose.

(8) *Absorptive power.* The absorptive power of ground talcs is a property which has never been determined commercially, but in many uses of talc it is probably of greater importance than has been suspected. In the manufacture of paints the oil absorption of the various paint materials is of great importance, but even for this use talc producers do not determine the absorption. It is probable that when talc is used in the manufacture of paper the absorptive power of talc has an important effect upon retention. When talc is used as a deodorant, a decolorizer or degreasing agent it is certain that absorptive power is very important. It is possible that the oil absorption test of the paint chemist might be used to determine the absorptive power of talc in general for various uses. But this subject is not well understood and is worthy of careful consideration.

(9) *Behavior under heat.* Massive talc and soapstone have long been used as both heat-resisting and heat-retaining agents, and ground talc has been used in pipe-covering compounds and fireproof paint. The last use is growing in importance and the value of talc as a fireproofing material is becoming better known. When used as a ceramic material in the production of china and porcelain its behavior under high heat is of great importance. Some talcs contain mechanically combined water, others contain lime, dolomite, iron or other impurities which may alter the color, destroy the slip, or cause the talc to swell under heat. Pure talcs vary in melting point and in behavior under high heat in ceramic compounds. Standard and uniform tests for the behavior of talc under heat should be devised.

Chemical Tests

Pure talc contains, theoretically, 63.50% silica (SiO_2), 31.70% magnesia (MgO) and 4.80% water (H_2O), but talc of exactly this composition is practically never found in nature. Impurities often found are alumina (Al_2O_3), iron oxide (FeO or Fe_2O_3) usually as calcite (CaO), iron sulphide or pyrite (FeS_2), an excess of lime of magnesia (CaMg), as dolomite ($CaCO_3$), an excess of silica as quartz (SiO_2), and sometimes as magnesia oxide (MnO). For some uses none of these are objectionable, but for most purposes several or all are harmful. Silica and alumina are inert but may form grit. Iron oxide and sometimes iron sulphide (in paper) injure the color. Manganese oxide is not often found, but when present may discolor the talc. The presence of small amounts of lime or dolomite for many uses is not objectionable. Some paper chemists object to lime on the ground that it causes foaming and tends to neutralize the sulphite solution; but other paper manufacturers do not object to carbonates. In fact, it is stated that in some paper mills ground limestone or calcium carbonate is used exclusively as a filler.

The presence of some of these impurities may be easily detected under the microscope but the relative percentages may only be determined by chemical analysis. Simple quantitative tests for iron and for carbonates are usually sufficient and a complete chemical analysis is unnecessary.

In addition to a chemical analysis, the determination of chemical behavior in different solutions, for example the resistance to acids and alkalies, and the determination of such physico-chemical properties as colloidal suspension in water, oil, etc., are often important.

Conclusion

The present or possible future uses of ground talc as well as the basis of sale and purchase are closely dependent upon physical and chemical properties. Yet no two talc producers or consumers make the same or even comparable tests. Adequate, uniform tests for all important properties have not even been devised. Hence the grading of talcs is not uniform and is based solely on the ideas of each individual.

No comparable price quotations from the different producing districts is possible and consumers are dependent almost solely upon the word of the salesman or jobber for the statement of grade. On the other hand improperly prepared talcs entirely unsuited for certain uses may be sold by irresponsible dealers to the detriment of the whole talc industry.

The difficulty of comparing talcs, as now prepared, from various districts is fully appreciated, but the determination of and agreement upon a series of standard tests would go far toward stabilizing the industry. It would form a basis for a comparison of the relative efficiency of various methods of grinding and preparation and would aid a logical extension of uses. It is to be hoped that the standardization of tests and grades will be undertaken.—U. S. Bureau of Mines, Reports of Investigations.

August Building Operations

BUILDING OPERATIONS during the month of August showed a slight increase over July, according to statistics compiled by the F. W. Dodge Co. Contracts awarded during August in the 25 states comprising the northeastern quarter of the country amounted to $205,651,000, as against $204,398,000 for July.

While this increase is not sufficient in itself to indicate an upward trend in construction activity, there are other factors which encourage the belief that the temporary slump is nearly over.

The amount of contemplated work reported in August was $357,510,000, compared with $334,341,000 for July. This increase, in view of the enormous pressing demand for buildings of various classes, gives some indication of reawakened interest in carrying out the year's building program.

An idea of the amount of deferred construction at present may be gained from the figures on contemplated projects reported by the F. W. Dodge Co. for the first eight months of the year, which have reached the sum of $3,661,451,000. Normally the amount of contracts awarded during the same period would amount to about two-thirds of the amount of work projected. Consequently, to preserve the normal proportion, contracts awarded for the eight months should amount to about $2,400,000,000, whereas the actual amount is $1,952,528,000, leaving a deficit of about $450,000,000 worth of construction.

The indications for the remainder of the year are that the succeeding months will show much greater activity than has been in evidence during the summer months.

Wonderful sand and gravel deposit on southern shore of Puget Sound

Pioneer Sand and Gravel Co.

Pioneer Sand and Gravel Company Plant Near Seattle

Hydraulic Mining and Sluicing of Material to Plant—A Wonderful Gravel Deposit

POSSIBLY NO OTHER PLACE in the world has a finer or more extensive deposit of sand and gravel than that at Steilacoom, about 40 miles from Seattle, Wash. This deposit is on the shore of Puget Sound and rises above the water level to a height of 225 ft.—one solid bank.

The view at the head of this article gives some faint idea of the extent of this deposit, but it would be impossible to show in anything but a birds-eye view the immensity of this gravel bank. Out of this bank approximately 5,000,000 cu. yd. have already been taken, but millions of yards have been left in the part already worked over, and millions of yards are yet available, using the same method of operation.

This method of operation is possibly unique in the sand and gravel industry, although it is an adaptation of a method of hydraulic mining, which was a distinctly California development, and at one time was a popular method of placer mining for gold in that section of the country.

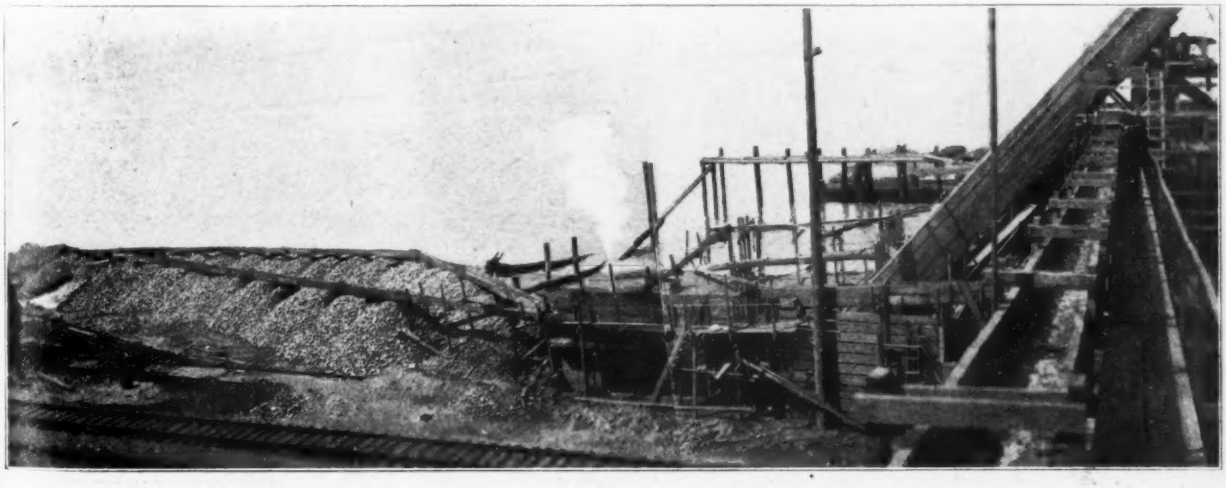
Aside from removing the tree stumps, practically no stripping is required. And even this is not necessary as the method of mining employed takes care of the stumps that fall into the pit automatically by washing away the material around them. The few inches of top soil are negligible in a face 200 ft. high.

The views show the method of operation so clearly that no extensive description is necessary. For its success of course one must have plenty of water available. In this case there is all of Puget Sound to draw upon.

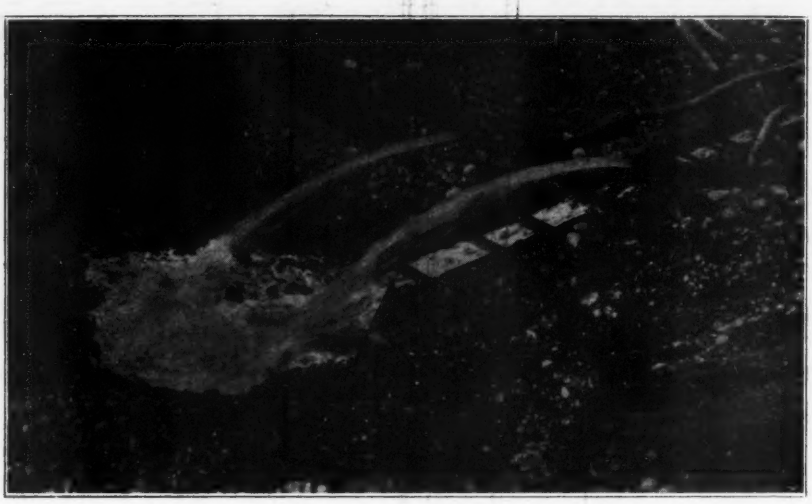
The Pioneer company has recently completed a new reinforced-concrete pumping plant, with a motor-driven direct connected centrifugal pump, which has a capacity of 4000 gal. per min. when pumping against a 225-ft. head, and 9000 gal. per min. against a 100-ft. head.

The water from this pump is pumped direct through steel pipe of various sizes, depending on the number of nozzles they supply, direct to the face of the bank. Near the foot of the bank sections of ordinary fire hose are connected to the ends of the water mains.

Each water main and hose extensions has its corresponding sluiceway, or

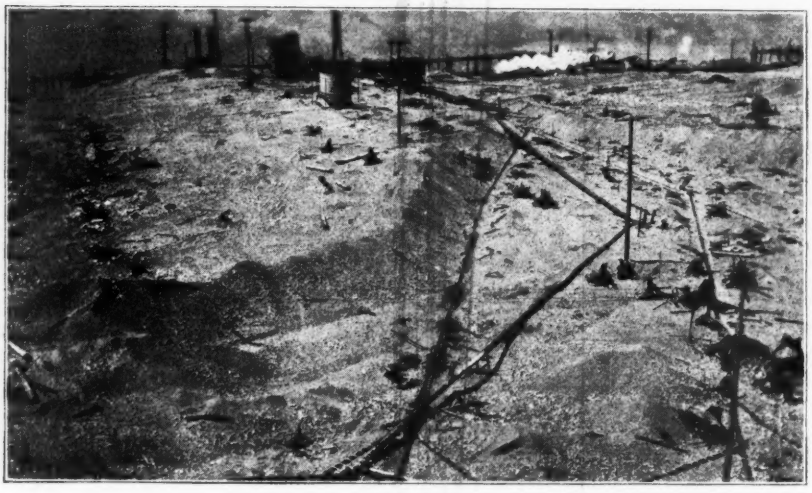


More stone (gravel) than there is a market for—crushing unit of the screening plant

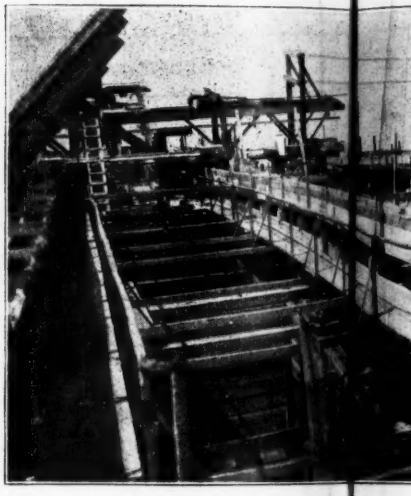


Two nozzles and flume at the beginning of the operation

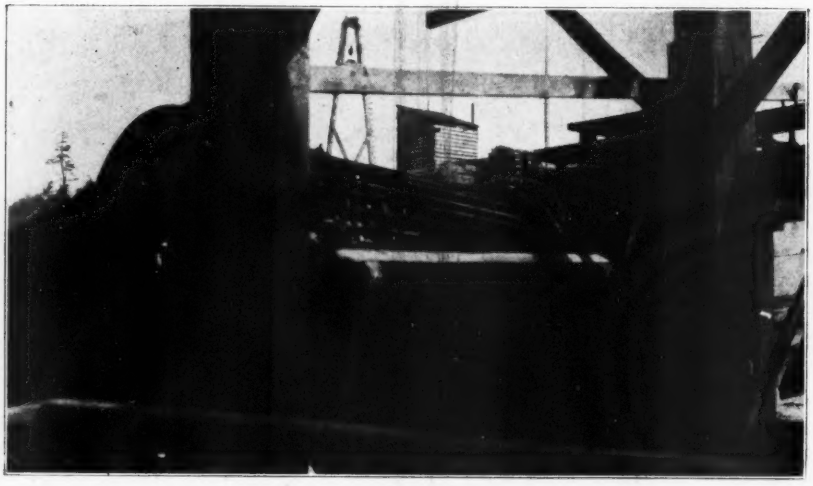
Nozzle tender showing character o



The screening plant from the bank showing network of flumes and pipes



Parallel flumes approaching plant from the

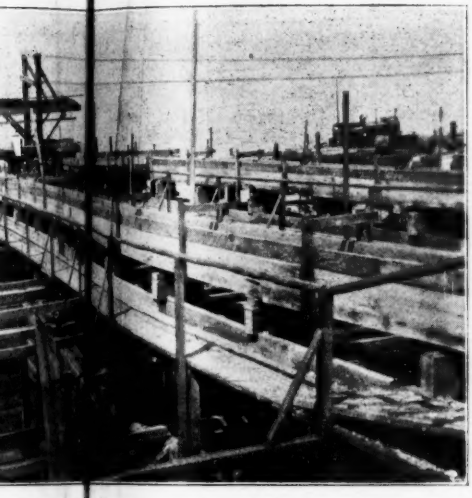


Rotary bar screen or grizzly for removing over-size

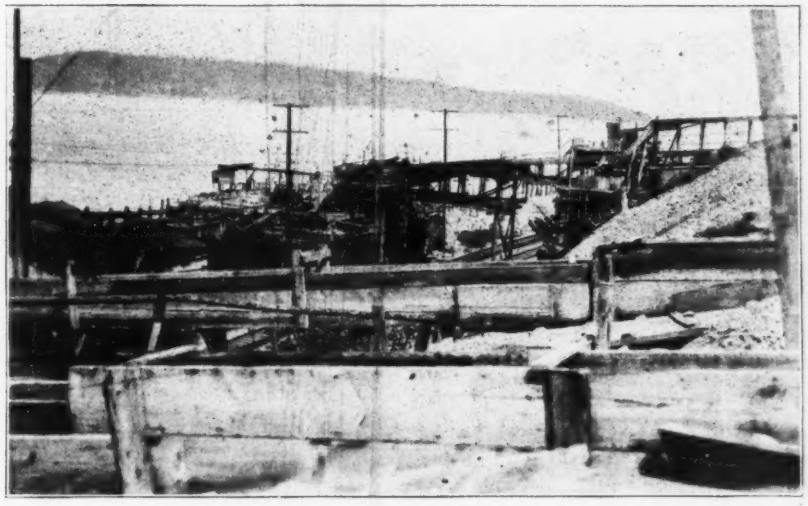
The plants from the loading wharf showing

er showing character of material in bank

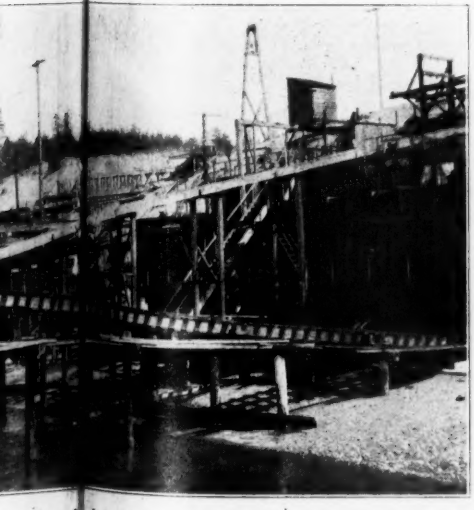
Nozzles and flumes showing junction of two flumes at bank



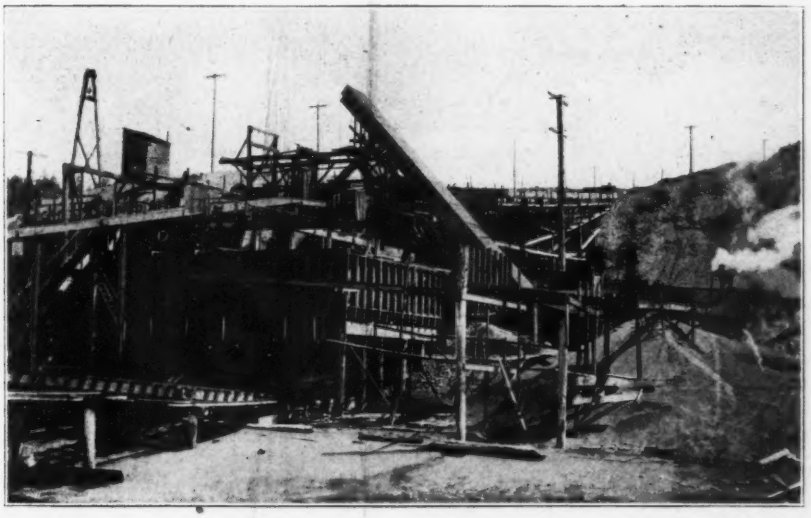
aching plant from the junction of smaller flumes



The two plants or two screening and crushing units of the same type



loading wharf showing pumping station in center



Another view showing bin construction and height of plant as compared with bank

flume, for removing the sand and gravel washed out of the bank. The method of operating the nozzles is clearly shown in one of the accompanying views. There are two nozzles to a sluiceway, one on either side.

In hydraulic mining and in all similar operations to this, so far as known, it is customary to use a very large nozzle, or hydraulic monitor, and apply the stream to the bank under a pressure of 100 lbs. or more to the square inch. It has been found here that there is much greater economy of operation in working with a much lower pressure and smaller nozzles.

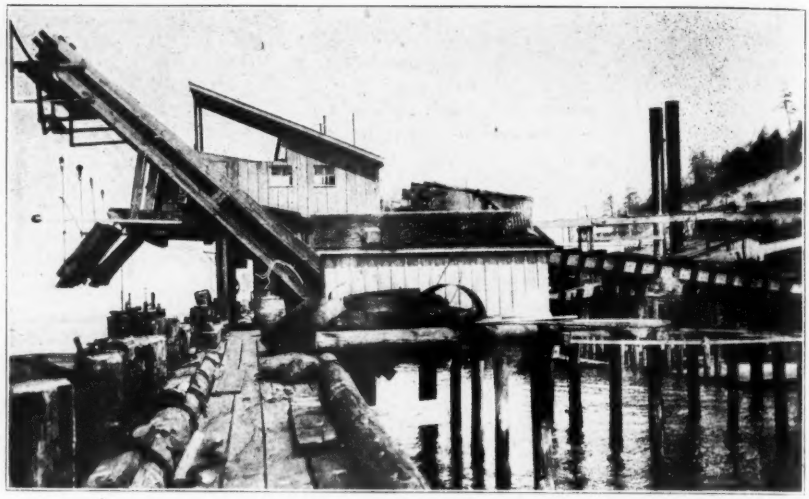
The action is not to tear the material from the bank by the force of the water, but to slowly and surely undermine the bank so that there is a steady slipping of the material into the mouth of the sluiceway or flume. There is a much more uniform flow with this method and far less loss of water. One man usually tends two pairs of nozzles, changing their position as conditions demand.

The flumes are nothing but timber boxes lined on the bottoms and sides with steel plates. The steel plates used for this purpose are old band-saw blades, about 12 in. wide, which can be purchased as scrap and serve the purpose admirably.

The flumes, like the pipe lines, vary in size according to the service expected of them. They start at the bank with a cross-section about 12 in. on a side and join together into larger flumes, and eventually into two parallel flumes of large size which carry the material to the screening plant.

In order to function properly the flumes have to be laid on a slope or grade of about 12½ per cent. as a minimum (12½ ft. vertical fall to 100 ft. in distance). This of course makes it necessary to leave a constantly increasing part of the deposit untouched as the distance from the screening plant increases. But with such an immense deposit, this feature does not cause any present worry, although in this instance, a supplementary drag-line plant has already been constructed, and material is also being taken out at the lowest level with a steam shovel.

The hydraulic method of excavation and conveying requires about one gallon of water per minute to one cubic yard of sand and gravel per day or 600 gal. of water to excavate and move one cubic yard of sand and gravel. Roughly the material flowing in the flumes is 25 per cent sand and gravel and 75 per cent water. The water, of course, is salt water, and therefore has a slightly greater specific gravity or density than fresh water, so somewhat less is required to transport the sand and gravel than would be required in the case of fresh water.



Barge-loading facilities—skipways and dumping chutes

Barge loaded with gravel ready to be towed to Seattle

Screening Plant

The screening plants of this company, for there are really two distinct plants, side by side, are unusual in some features. The flumes discharge into rotating grizzlies or bar screens, which reject at once everything above commercial size (3 in. or 2½ in.) This material, the oversize, is chuted to a small jaw crusher and returned to the grizzly after crushing, or sent around the crusher and is wasted. As a matter of fact a good deal of it is wasted as the proportion of gravel in the deposit gives more than can be disposed of with the amount of sand produced.

The sand and finer gravel passing the bar screen drop upon an inverted V-shaped gravity screen, over which are sprays of water so directed that the water is thrown against the screens with considerable force, thus helping force the fine material through the perforations. These screens make the separation between the small sizes of gravel and the sand.

The sand is sluiced to longitudinal troughs or boxes, built across the ends and on the top of the sand bins. These settling boxes are provided with bottom valves, hand operated, so that they discharge continuously into the proper bin. By adjustment of the valves and the use of baffles almost any size or mixture of sand can be obtained, or different sizes of sand may be sent to different bins, depending on the part of the settling box that is tapped.

The most interesting feature of the screening plant is its extreme simplicity. The rotary bar screen is the only piece of equipment other than the small jaw crusher, which requires power for its operation. The material is very clean and of course the entire process from bank to screens is one continuous washing and scrubbing operation. Consequently rotary sand screens are not

necessary for cleaning purposes and as market conditions do not require an elaborate separation of sizes, the operation is ideally suited to the circumstances. Only about 20 employees at this plant are required to produce an average daily output of 2500 cu. yd.

Shipping Facilities

The bins are provided with bottom gates. Skip cars holding about 7 cu. yds. are run under the bins, loaded and hauled up an incline, from the end of which they dump automatically into deck-load scows or barges. These barges hold about 450 cu. yd. and are towed to and from the company's docks and bunkers in Seattle by a fleet of steam tugs.

The main line tracks of the Northern Pacific Railway and the Oregon-Washington Railway and Navigation Co. between Portland and Seattle run by the plant, on the shore of the sound, and car loading bins are also provided, although the largest part of the shipments are made by barge to Seattle.

The president and chief owner of the Pioneer Sand and Gravel Co. is H. F. Ostrander. Many improvements are constantly in progress and Mr. Ostrander promises that this will eventually be one of the star plants of the industry. Paul Jarvis is general superintendent of the plants at Steilacoom, Wash.

Building Operations in 1919

COMPLETE RETURNS made to the United States Geological Survey, Department of the Interior, from the building departments of 141 of the larger cities of the country show a large increase in building operations in 1919 compared with 1918. The building operations in these cities in 1919 cost $1,302,998,607, as against $430,014,365 in 1918, an increase of 202 per cent. Much of this increase is due, of course, to the increase in the cost of labor and materials, but this does not cover all of it, for the number of permits or buildings increased from 210,538 to 362,811, or 72 per cent. The average cost per permit or building increased from $2,042 in 1918 to $3,591 in 1919, and the average cost of new construction increased from $3,309 in 1918 to $5,088 in 1919.

An interesting fact brought out by the geological survey's report is the large proportion of wooden buildings erected, even in the larger cities, where, it may be expected, structures of such material would be limited by local regulations. Wooden buildings represented 67 per cent of the total number of classified operations in 128 of these cities, 73 per cent of all new operations, and 69 per cent of all additions, alterations and repairs.

In these cities 55 per cent of the number and 84 per cent of the cost of operations were for new work; 39 per cent of the number and 15 per cent of the cost were for additions, alterations and repairs; and 6 per cent of the number and 1 per cent of the cost were for miscellaneous operations. Of the cost of all operations 32 per cent was for wooden buildings, 44 per cent for brick or hollow-tile buildings, 1 per cent for stone buildings, and 11 per cent each for steel-skeleton buildings and concrete buildings.

The continued tendency toward economy in construction is shown by the increase in the average cost of additions, alterations and repairs in 1919, which was $1,298, compared with $900 in 1918 and $894 during the preceding ten years.

Ontario, Canada, Improves Highways

ACCORDING to W. A. McLean, deputy minister of highways for Ontario, about $13,500,000 is being spent this year by the province for roads. Of this amount $2,500,000 is being spent in accordance with legislation passed last session providing that the government pay 20 per cent of the cost of road work done by the township; $7,000,000 is being spent on country roads, and $4,000,000 is being spent on 1,800 miles of provincial roads planned. Of this latter system, 600 miles are now actually under construction. Altogether there are some 3,000 men now being employed directly by the department on road construction work. Nine hundred miles of country roads are under construction.

J. George Leyner Killed in Automobile Accident

JOHN GEORGE LEYNER, of Denver, Colo., who was killed in an automobile accident near Denver on August 5, 1920, was an American genius of exceptional ability, a pioneer in rock drilling and mining appliances and an inventor who has contributed much to the industrial progress of his age. No man, in fact, has done as much in the past generation to advance the art of removing rock. Through his inventions the rock drill has passed from the percussive stage, involving machinery of heavy weights, to the hammer stage, where the rock drill has become a thing but little larger than a pneumatic tool.

J. George Leyner

Mr. Leyner was the first man to attack the percussive or piston type of rock drill. He pointed out what was generally admitted, that the piston type was necessarily heavy, that it was limited in drilling capacity, because of the limit to the number of strokes it could make, and he advocated and patented the use of the piston as a hammer only, to strike the end of the steel or an intervening medium connected with the steel. He introduced a water jet through the piston into the bit for clearing the hole cuttings. His system patent was taken out in 1903 and his method patent in 1904.

The most generally used drill of today, the "Jackhammer," not only in America, but throughout the world, is built on Leyner's principle. It is not generally known that Mr. Leyner built the original shredded-wheat machines also.

Mr. Leyner was born in Boulder County, Colorado, in 1860, being the first white child born in that county. He was the son of Mr. and Mrs. Peter A. Leyner. He leaves a widow and three adopted children.

American Potash Supply Increasing

SEVERAL LARGE PLANTS for the manufacture of potash in the United States are nearing completion, according to a report made at the recent annual meeting of the U. S. Potash Producers' Association recently held in Chicago. It is expected that the output of potash in this year will double that of 1920.

Before the European war almost all the potash used in this country was imported from Germany, where there are enormous deposits of the valuable mineral which is extensively employed as a fertilizer and also in the arts.

By encouraging the production of potash in this country Americans will no longer be under the dominion of the German syndicates. A recent report of the United States Geological Survey also shows that France is able now to sell considerable quantities of the element, for there are extensive deposits of it in her regained Alsace.

Practical Chemistry for Lime and Cement Manufacturers

XIII—Carbon, Continued—Compounds Carbon Dioxide and Carbon Monoxide

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, 11-13 E. Fayette St., Baltimore, Md.

CARBON DIOXIDE is composed of two atoms of oxygen united to one atom of carbon. It is formed wherever carbon burns in sufficient oxygen or air to form the compound. Carbon dioxide combines with various oxides to form carbonates—thus carbon dioxide combined with calcium oxide forms calcium carbonate, with magnesium oxide magnesium carbonate, with sodium oxide, sodium carbonate.

Carbon dioxide is a heavy colorless gas with pungent odor. It is one and a half times as heavy as air and does not burn nor support combustion nor will it sustain life. A candle placed in a vessel of carbon dioxide will be immediately extinguished just as if it had been plunged in water. Carbon dioxide is not of itself poisonous, but a living being in an atmosphere of carbon dioxide would smother to death because of its being deprived of oxygen. As it is such a heavy gas, it does not mix well with other gases such as air, and often collects in the bottoms of wells and pits. For this reason it is well to examine all excavations and pits by lowering a lighted candle into them. If the candle goes out, the presence of carbon dioxide is probable, and the opening should be ventilated before venturing in. Precautions of this sort are particularly necessary around lime kilns because of the presence of carbon dioxide in large quantity in the kiln gases. Carbon dioxide is the deadly "after-damp" of the miners.

Carbon dioxide is soluble in water to a small degree at ordinary temperatures and forms with it a weak acid, carbonic acid, H_2CO_3, which decomposes very easily. This acid forms the carbonates.

$$H_2O + CO_2 = H_2CO_3$$

$$H_2CO_3 + Ca(OH)_2 = CaCO_3 + H_2O$$

When an acid acts on a carbonate effervescence takes place and carbon dioxide is given off. This reaction may be considered as occurring in two stages.

$$CaCO_3 + H_2SO_4 = CaSO_4 + H_2CO_3$$

Carbonic acid is, however, a very unstable or easily decomposed acid and almost immediately breaks up into carbon dioxide and water.

$$H_2CO_3 = H_2O + CO_2$$

The carbon dioxide in escaping from the liquid causes the bubbling.

Carbon dioxide is quite soluble in water under pressure. *Soda-water* is simply a solution of carbon dioxide in water at slight pressure. When the pressure is relieved, as is the case when the bottle is uncorked or the soda water drawn from the fountain, the solubility of the gas in water decreases and the excess gas over what the water would dissolve at normal pressure is liberated and escapes in bubbles.

When fermentation takes place carbon dioxide is also formed, this causes the foaming of beer and the raising of bread by yeast. Baking powder is composed of some acid compound such as cream of tartar and acid salt of tartaric acid and bicarbonate of soda; when water is added the stronger tartaric liberates the weaker carbon dioxide and the bubbles of this gas forming in the dough makes the bread porous.

Carbon dioxide is usually prepared in the laboratory by acting on calcium carbonate with sulphuric acid. The former is usually marble or very pure limestone. Dolomite which is a mixture of calcium carbonate and magnesium carbonate is preferred however to the limestone.

Carbon dioxide may also be prepared by heating calcium carbonate. Joseph Block who discovered carbon dioxide so prepared it and called it "fixed air" because it was a gas contained or fixed in this solid. All common carbonates except those of sodium and potassium decompose on heating into carbon dioxide and the oxide of the metal, thus—

$$CaCO_3 = CaO + CO_2$$

$$MgCO_3 = MgO + CO_2$$

This reaction, is of course, familiar to all lime manufacturers. The reverse of this reaction also takes place and if we pass carbon dioxide over heated lime, calcium carbonate is formed:

$$CaO + CO_2 = CaCO_3$$

Reactions such as this are often written by replacing the equality mark by arrows with the heads pointing in opposite directions to indicate the reversability of the reaction. Reactions which are not reversible are then written with a single arrow.

Carbon Monoxide

Carbon monoxide is formed when carbon burns in an insufficient quantity of oxygen or air. It contains only half as much oxygen as carbon dioxide as will be seen by its formula CO. It will combine with the necessary oxygen to form carbon dioxide, however, quite readily and will in so doing burn with a pale blue flame and give off considerable heat. It is a colorless gas, slightly lighter than air, without taste and with but little odor. It is a quite poisonous gas on its own account and not by reason of the exclusion of oxygen.

Carbon dioxide does not occur in nature but forms one of the principal constituents of water gas. If carbon dioxide is passed over red hot carbon it gives up half its oxygen to the carbon and forms with the latter carbon monoxide according to the reaction.

$$C + CO_2 = 2CO$$

This reaction plays an important part in the manufacture of producer gas as will be explained further on.

Carbon monoxide may be looked upon as a compound of carbon and oxygen which lacks the full amount of oxygen to satisfy the carbon. Carbon normally has a valence of 4 and hence requires 2 atoms of oxygen to satisfy it—oxygen having a valence of 2. Carbon monoxide may be considered, therefore, as a gas in which carbon is seeking the extra atom of oxygen. Many oxides are reduced to the metal by carbon monoxide thus, if carbon monoxide is passed over heated iron oxide, iron and carbon dioxide are produced

$$Fe_2O_3 + 3CO = 2Fe + 3CO_2$$

(To be continued).

July Export of Cement

EXPORTS OF CEMENT during the month of July totaled 156,713 barrels, valued at $529,886, according to figures compiled by the Department of Commerce for the Washington Bureau of Rock Products. During the same period, our imports amounted to 11,286,000 pounds, valued at $70,255.

While no details are available as to the countries from which cement was imported, the export figures show that most of the cement shipped out of the country was destined for Cuba, exports to that country totaling 54,225 barrels, with a value of $165,736. Our next most important customer was Brazil, with 21,380 barrels, valued at $66,890, followed by Mexico, with 15,303 barrels, worth $54,847. Shipments ranging from 21 barrels up were also made to thirty other countries.

Editorial Comment

Coal Case Continued

Announcement was made on September 20th that the Department of Justice at Washington will shortly ask for the indictment on charges of profiteering of about 250 coal-mining companies in Maryland and West Virginia. Developments in this case will of course be followed by the rock products industry with great interest, not only because so many producers of building materials have been at the mercy of the coal operators, but because this prosecution of the coal operators is undoubtedly very largely due to the facts brought out at the hearings of the Interstate Commerce Commission on the uses of open-top cars.

Whether the coal operators are found guilty or not, they will achieve a great deal of very undesirable notoriety and be considerably hampered in their future operations of a like nature. In other words they are likely to reap an ample harvest of undesired results; and competitors of the coal industry for open-top cars have the satisfaction of knowing that to a large degree it was the abuse of the special car-service privilege that brought these things on the heads of the coal operators.

The section of the Esch-Cummins railway law that makes possible continuous repetitions of conditions such as we have just passed through, will in the future be regarded by the coal operators in the light of the experience gained in 1920. If they are wise they will hardly want to start up a similar hornet's nest for a good long time. In the meantime the efforts of the other users of open-top cars to have the obnoxious section of the railway law struck out by the next Congress should be redoubled.

Business Outlook

Thirty-two fundamental questions regarding the present industrial, agricultural, financial and political situation were recently sent out by the Fidelity and Deposit Company of Maryland, Baltimore, to its representatives in every part of the country. Answers to these questions were sought by personal interview with prominent business men in all parts of the country, and these answers were telegraphed to the main office, tabulated, and made public September 21.

The first question asked was as to building conditions and the tabulation shows that building was increasing in every section of the country except the Middle Atlantic states, the Northern Central states and the Rocky Mountain states. In the East the construction of factories and warehouses leads but in all other sections the construction of low priced dwellings or homes of moderate cost predominates in the building construction activity.

Only in the Middle Atlantic states was a shortage of labor reported but in no section of the country was there any evidence of unemployment. The cost of labor in 1920 has pretty generally increased over the length and breadth of the land from 5 to 50 per cent. There was no noticeable increase of labor efficiency over 1919, but in every section of the country there has been a marked increase in the number of individual savings bank accounts opened—a most significant sign of returning thrift; and thrift and efficiency ordinarily go hand in hand.

All reports showed that the transportation situation was improving and the car shortage being reduced. The industrial and banking situation appears to be excellent for a gradual return to normal conditions, and the agricultural situation as a whole has seldom been better, as good crops and good prices for the farmer are reported from all sections. The recent drop in the price of grain has had apparently little effect on the general prosperity of the farming element.

In every part of the country except the "solid South" dissatisfaction with the present administration at Washington is held responsible for many of the present day industrial and political ills, and the sentiment of business circles everywhere except the South seems to be strongly republican.

Burning Limestone

The article elsewhere in this issue headed "Limestone that can't be burnt in shaft kilns," was prepared for publication several weeks ago, and in the light of the editor's recent observations in northwestern Massachusetts should possibly be revised, for there is at least one lime plant in the East that has apparently solved the problem of burning a very similar stone to that at Santa Cruz in shaft kilns.

Of course no two limestones from different sections of the country are ever identically the same either chemically or in physical structure. Consequently every lime burner knows that one can not draw final conclusions as to the treatment of one stone by the experience of other lime burners with a similar stone. Nevertheless a conclusion that such and such a thing *can't be done* is often reached without a knowledge of what has been done under similar conditions.

The experience of the Santa Cruz lime producers is by no means conclusive and as a lesson to other lime plant operators should be merely to emphasize the very great need of a free interchange of such experience and a greater study of some of the "technique" of lime burning. The columns of Rock Products are open at all times to every lime burner for a discussion of problems which trouble him, and every new excursion of the editor into lime-burning sections of the country convinces him that there is always some operator who has met and successfully overcome just that problem, and he is always ready and willing to tell how.

Cement Engineers Hold Convention

DISTRICT ENGINEERS of the Western Offices of the Portland Cement Association gathered in Seattle August 16th, 17th and 18th for the first Western meeting of District Engineers. Greater portion of the three day convention was spent inspecting concrete pavements in King, Snohomish, Pierce and Thurston counties, visiting street pavements in the various principal cities in these counties, and inspecting sand and gravel deposits. The visiting cement men were greatly impressed with the exceptionally fine quality of concrete pavements in Western Washington. During their stay an opportunity was afforded them to visit several road paving jobs under construction.

Among those in attendance were the following: Wm. M. Kinney, general manager, Chicago; A. E. Johnson, consulting highway engineer, Chicago; C. R. Ege, engineer road-bureau, Chicago; C. N. Reitze, Pacific Coast manager, Seattle; F. T. Boltz, district engineer, Helena, Mont.; P. F. Meade, district engineer, Denver, Colo.; W. F. Long, district engineer, Salt Lake City; H. H. Fillmore, district engineer, Los Angeles; A. P. Denton, district engineer, San Francisco; Hans Mumm, Jr., district engineer, Portland; R. L. Rowland, district engineer, Seattle; F. H. Cushman, engineer, Spokane; A. L. Strong, engineer, Yakima; J. D. Neville, engineer, Chehalis; L. E. Bufton, engineer, Portland; C. P. Watkins, engineer, Seattle; Frank Barrett, office manager, Seattle.

Blue Diamond Plaster Co. Takes Over Temescal Rock Co., Corona, Calif., for Over Million Dollars

THE RECENT report that the Blue Diamond Plaster Co., of Los Angeles, Calif., had purchased the Temescal Rock Co., of Corona, has been verified and it is understood that the purchase price was in excess of $1,000,000. Although the plant, which is electrically operated, has a daily capacity of 1,500 tons, the output is not equal to the demand for the Temescal rock, it is stated by officials of the Blue Diamond Plaster Co., and new machinery and equipment are to be installed to increase production. All told the entire plant will be renovated so as to make it capable of its original estimated output. According to W. N. Hay, vice-president of the company, this rock is used extensively by contractors and builders because of its toughness and light weight. The abrasive tests, it is stated, have shown that this rock loses only 10 per cent in the crushing process, while rock crushed from ordinary granite boulders loses as high as 33⅓ per cent.

Potash Bearing Rock Discovered in Pennsylvania

New Company Incorporated for $350,000 to Develop Unusual Rock Deposit Found in Tioga County, Pa.

THE WILD STORY OF POTASH being discovered in Tioga county, Pa., some two years ago was perhaps not so much a fairy tale as many thought then, and some still insist. A company of Tioga county capitalists have purchased a square mile of what is known as Potash Mountain at David Station, and have formed a company with a capitalization of $350,000.

Valuable Fertilizer Product

According to recent reports the core obtained gives a section of the hill and beginning at the 50-ft. mark, samples of the rock were taken at every 10 feet and the combined samples thus obtained were ground and submitted to two chemists for analysis. Each chemist worked entirely independent of the other and each had his work checked by other chemists with the result that above 3 per cent potash was revealed. There were also found other minerals, practically all of which are of value for use in fertilization of the soil. The main content of the rock is silica, or sandstone, which as a filler in combination with the other minerals constitutes a grade of fertilizer that is believed will find ready sale. Few fertilizers on the market contain more than a small percentage of potash. Practically all the potash contained in the fertilizers now on the market is brought from Germany and added to the compounds or mixtures, and since the war the inability to obtain this supply has almost driven potash fertilizers from the market. When they were on sale the commercial fertilizers contained of potash from 0 to 4 per cent, the majority having none, and those containing it mainly 1 or 2 per cent potash.

In one piece of core at a depth of 142 feet, fragments of potash rock were found that were 50 per cent potash, or more, giving rise to the belief that at places in the rock there are stratas of potash in almost pure form. But the fact which the investigators think is of the most value and of a reasonable degree of certainty is that the mass of rock when ground constitutes a fertilizer that possesses most of the desirable elements necessary for soil enrichment and particularly a quantity of potash sufficient to make it a fertilizer that will be in great demand.

Gravity Plant to Be Established

The proposition for handling the rock from the hill which was christened "Hill KNO3," is to establish a plant for crushing the rock at a point about half way from the base of the hill to the summit. There the rock could be quarried out, run by gravity to the first crusher and there given the first crushing, reducing the rock to about 4 in., and then by gravity fed into a second crusher that would further reduce the size of the pieces, then again by gravity fed into a third crusher that would grind it to a powder, so the handling of the rock could be done in the most economical manner conceivable, entailing no handling or rucking of the product before shipment.

Industry of Great Importance

Thus if the product of ground rock from Hill KNO3 is the valuable fertilizer which chemists believe it to be, the way seems open and easy for the establishment of an industry of great importance, and at the same time Hill KNO3 will be delved into with the possibility of finding what is thought, probably, by a Canadian geologist who has made some investigation of the property, namely, the finding of strata or stratas somewhere in the hill where the potash has been precipitated in a complete or unmixed form. So with an agricultural fertilizer capable of being produced at a fine profit, to carry the enterprise on and furnish the sinews of war and the possibility of finding in the strong box of the hill a treasure of great wealth it is a situation to intrigue the interest of all people in this section.

Alsatian Potash Output Increased

THE PRODUCTION of potash salts in Alsace during the year 1919 reached the figure of 591,471 tons, an increase of 65 per cent as compared with the output during 1913, which amounted to 350,341 tons. There is good reason to believe that the production of these salts in Alsace will be considerably larger during 1920, as difficulties connected with the transfer of the mines from Germany to France curtailed the output last year.

The yield of pure potash during 1919 was 96,546 tons, of which 30 per cent was exported to the United States.

The Chamber of Deputies of France has approved a bill providing 75,000,000 francs for the purchase by the government of the Alsatian potash mines under sequestration, advices received by the Department of State declare.

Conveyor Hazards and How To Minimize Them

(Prepared for "Rock Products" by the engineering staff of the National Safety Council)

THIS IS THE FIFTH of a series of articles on conveyor hazards begun in August 14 issue of ROCK PRODUCTS.

Bucket Conveyors and Elevators

The bucket conveyor or elevator consists essentially of a chain to which is attached at regular intervals, buckets for hoisting and conveying the material to be handled. They are commonly used for coal handling equipment in stone-crushing plants, and the like, and present approximately the same hazard in their use as the belt and flight conveyors.

Where bucket elevators are enclosed as in cement plants it is customary to provide removable sections (doors) in the enclosure for inspection purposes. No attempt should ever be made to remove material from the buckets at these inspection doors while the elevator is running.

For emptying the buckets at any desired location, tripping devices are provided. These are so placed that they will trip the bucket and empty its contents wherever desired. It is best that the control mechanism for shifting and locking the trippers be so arranged that it may be operated from a place of safety so that workmen will not need go on the conveyor-way to change the position of the tripper.

Where the conveyors hoist the material and carry it along over stokers or bins, it is advisable to provide a permanent foot-walk alongside the conveyor for the safety and convenience of repairmen and operators.

Safety Stop

A bucket elevator or an inclined conveyor operating under a load will, unless a safety stop is provided, reverse and carry the material to the loading point if the power is suddenly cut off. Such an occurrence will undoubtedly cause much annoyance and may result in serious damage to the equipment or injury to persons. Every bucket elevator or conveyor should be provided with a mechanical device which will prevent the machinery running backward.

Apron Conveyors

Apron conveyors or slat conveyors consist essentially of two strands of link belts or chains to which planes or strips are attached so as to form a continuous surface. The apron or slat conveyor or carrier is particularly suited for handling abrasive materials.

Portable Conveyors

Belt, flight, and apron conveyors are sometimes made in portable motor-driven units mounted on wheels or suspended from trolley track and moved from one location to another in a plant. The hazards in their use are the same as with the stationary type.

The feed circuit should be armored cable, and all live electrical parts should be properly enclosed.

Car Hauls

Car hauls are commonly used in the mining industry for hauling cars up inclines in the quarries, and at crushing plants. These car hauls consist of a continuous link chain to which, at intervals hooks are attached. These hooks catch on the axles or projections underneath the loaded cars and pull them up the inclines.

It is important that the track along all car hauls be kept clean and free of lumps of rock or other material which may derail the cars. A walkway should be provided alongside all car hauls and separate therefrom by a substantial solid partition railing not less than 36 in. in height. A solid partition is advisable so that if cars should become derailed or the chain break, cars which may descend the incline will not injure workmen on the walkway; falling lumps will also be kept off the walkway.

Track Stops

In connection with every car haul a reliable mechanical device should be installed to prevent the cars from descending inclines should the power fail or the chain break. It is suggested also that at frequent intervals along the incline, stop blocks be installed which will permit the cars to ascend the incline but not to descend.

(To be concluded)

A Peculiar Gravel Plant Accident

A 15-YEAR old boy employee of the Warsaw Sand and Gravel Co., near Winona Lake, Ind., was buried beneath a pile of 100 tons of water-soaked gravel June 30. Nearly a hundred volunteer workers shoveled nearly two hours before the lad was rescued. He had been working at the top of a 60-ft. gravel bin which leads to the chute from which gravel cars are loaded. He stepped on top of the loose gravel in an effort to start it toward the chute and was carried down into the mouth of the chute, where he lodged with more than 40 ft. of gravel on top of him. Due to the construction of the chute much of the weight was relieved from the body and he was not fatally hurt.

The First Run of the 1921 Safety Calendar Is Ready for Distribution

Size 10⅞x18 in.

Each month of the calendar is printed on a separate sheet, with a clever, high-grade, three-color illustration at the top of each. Twelve humorous pictures, each driving home forcibly its own safety message.

Hazards common both to the home and the factory—serious because of the frequency of the accidents which they cause—are the subjects around which these illustrations are built.

This calendar offers a splendid opportunity to round out safety instructions given to the man in the shop by carrying the message into his home, to his wife, and to his children, and through them, back to him.

On quantity orders your firm name will be imprinted without additional charge. Write for an advance copy at once. It will be sent to you by return mail without any obligation on your part.

National Safety Council

Co-operative—Non-commercial

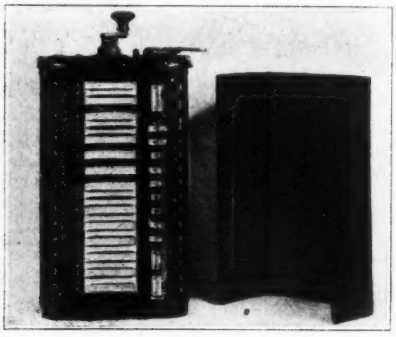
168 North Michigan Avenue, Chicago, Ill.

NEW MACHINERY AND EQUIPMENT

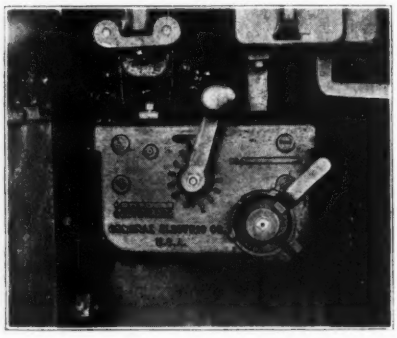
New Electric Locomotive

THE GENERAL ELECTRIC CO. has announced a new electric switching locomotive, which incorporates several interesting improvements over type formerly in use.

In switching and car-collecting work there is a considerable amount of barking to be done, owing to the numerous stops that must be made for throwing switches and couplings made to the individual cars. The consequence is that, with the hand brake, considerable physical effort is used by the motorman, who, if he is careless, developes the habit of stopping the locomotive by reversing the motors, with consequent damage to both the wheels, and the motors, gears, etc.



Elevation of controller

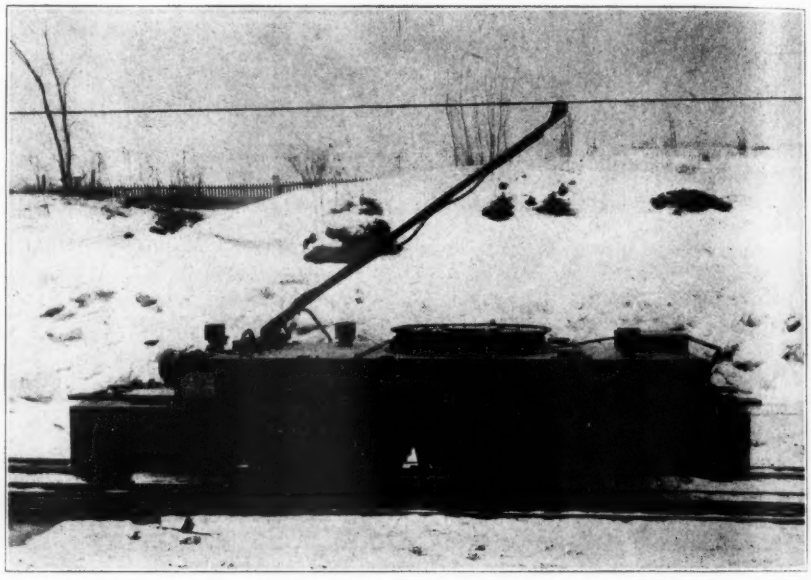


Top view of controller

The braking on the new locomotive is electrical to eliminate this trouble and is obtained by designing the controller so that, when the reverse cylinder is set at the braking position, the motors are turned into self-excited generators, the energy being absorbed in the main resistors. On a level track the motorman can bring his train to a dead stop without using the hand brake at all, but on a grade, since there is no energy developed when the wheels have stopped turning, it is necessary to set the hand brake to hold the train.

The controller is provided with a three position indicator, so that by setting it, forward, reverse, and braking are all obtained by moving the handle in one direction. Another feature of the controller is that the points are so arranged that the motorman cannot get to parrellel until he has been through series, hence he cannot get slow speed by leaving the reverse cylinder in the parallel position and running on resistance point, which has a bad effect on the resistors, and uses much more current than if the motors were in series.

The other feature of the locomotive is its spring construction. Instead of the ordinary coil spring, this locomotive is equipped wih leaf springs of the semi-elliptic type. The springs are hung at one end on the frame, the other being connected by an equaliser bar between the two on each side. The result of the use of this bar is that if one wheel encounters an obstruction or goes in a hole the change in load is transmitted to the other wheels. This not only gives the locomotive better riding qualities, but decreases the tendency to derailment. When it is derailed, owing to the high clearance between the rail head, and the lower edge of the side frame, which is a feature of its construction, it is comparatively simple matter to get access to the lower part of the wheel so that blocking, or other re-railing devices may be put into position.



New General Electric Co. locomotive

Paper Mold for Concrete Test Cylinders

THE STANDARD CONCRETE APPARATUS CO., Washington, D. C., has placed on the market a paper mold for concrete testing. It is sold under the trade name of Cyl-O-Con molds, and makes possible the testing of concrete on the job; they provide a link between job and laboratory.

The Cyl-O-Con mold is portable because it is light and collapsible. It is made of waterproof paper, and is collapsible because it is slit. One mold rests within another. As many as 25 can be nested in one roll not much larger than a steel mold. Just before using the molds are quickly and easily laced into cylindrical form with a stapling machine.

The things claimed of Cyl-O-Con molds are less shipping charges, less labor of cleaning, stripping, oiling and handling than steel molds.

Complete information of the mold will be sent to anyone on request to the company.

General News from Rock Product Markets

Ninth Annual Safety Congress

THE NEXT ANNUAL SAFETY Congress of the National Safety Council will be held at the Auditorium, Milwaukee, Wis., September 27 to October 1 inclusive. Every year more and more rock products producers are taking an active interest in these expositions and meetings. This year the cement section is particularly well represented on the program, as is also the rest of the quarrying industries.

The Congress this year, it is announced, will be more pretentious than ever before; in fact it will be largest safety congress ever held. It is the one time in the year when all men interested in safety work get together and exchange ideas. There will probably be in the neighborhood of 4,000 to 5,000 visitors this year, who are all interested in safety work.

One of the features of the Congress will be the showing of moving pictures on safety. The visitors at the Congress will be given an opportunity to see all the latest films which have been prepared on safety subjects. These moving pictures will be available to all members of the National Safety Council.

The program of the Congress, of which the parts pertaining to rock product industries is reproduced below, will have sessions on subjects, and then free for all discussions on them. There will also be an A B C session which was especially prepared for new members of the council.

TUESDAY A. M., SEPT. 28, 10:00 O'CLOCK
ENGELMANN HALL

The A B C Session

I. The Essentials of a Plant Safety Organization
W. E. Worth, assistant manager, Industrial Relations Department, International Harvester Co., Chicago.
II. The Foreman—the Determining Factor
F. E. Morris, secretary, Syracuse Safety Council, Syracuse, N. Y.
III. How to Promote Safety Education in a Plant
G. T. Fonda, general supervisor, Employment, Compensation and Welfare, Bethlehem Steel Co., Bethlehem, Pa.
IV. Getting Results from Plant Safety Committees
T. H. McKenney, supervisor of Labor and Safety, Illinois Steel Co., South Works, South Chicago, Ill.
V. Fundamentals of Safeguarding
David S. Beyer, vice-president and chief engineer, Liberty Mutual Insurance Co., Boston, Mass.
VI. General Discussion, Questions and Answers

TUESDAY P. M., 2:30 O'CLOCK—COMMITTEE ROOM A, SECOND FLOOR

Mining Section

I. Vocational Training as Influencing Safety and Efficiency in Mining
C. A. Mitke, consulting mining engineer, Bisbee, Ariz.
II. Industrial Nurses in Mining Communities (Metal Mining)
George Martinson, safety inspector, Hibbing, Minn.
III. Industrial Nurses in Mining Communities (Coal Mining)
IV. Getting the Safety Message to the Individual Miner
N. D. Hubbell, general manager, Davis Automatic Cradle Manufacturing Co., Uniontown, Pa.

JUNEAU HALL, FIRST FLOOR, 5:00 P. M.

First Aid Demonstrations

Director, Dr. H. W. Gentles, American Red Cross, Chicago.
Demonstrations presented by first aid team from Chicago, Rock Island and Pacific Railway Shops, Chicago.

WEDNESDAY A. M., SEPT. 29, 9:30 O'CLOCK
SOUTH ARENA

Cement Section

I. Employment and Personnel Activities and Their Relation to Safety Work
II. The Human Element as a Factor in Accidents
III. First Aid

WEDNESDAY P. M., SEPT. 29, 12:30 O'CLOCK
JUNEAU HALL, FIRST FLOOR

Safety Bulletins

I. Should Bulletins Be Commendatory or Critical?
II. Should Bulletins Be General or Specific?
III. The Sectional Bulletin.
IV. Bulletin Illustrations — Photographs vs. Drawings
V. Making Safety Bulletins—Where to Get the Material

WEDNESDAY P. M., 5:00 O'CLOCK.
WALKER HALL, FIRST FLOOR

Grain Dust Explosion Hazards

Practical demonstrations and specially prepared motion pictures presented by D. J. Price, engineer in charge of Grain Dust Explosion Investigations, Bureau of Chemistry, U. S. Department of Agriculture, Washington, D. C.

THURSDAY A. M., SEPT. 30, 9:30 O'CLOCK

Cement Section

I. Quarry Hazards
II. Electrical Equipment
III. Power Transmission Equipment

THURSDAY, 12:30 O'CLOCK, JUNEAU HALL, FIRST FLOOR

Employees' Benefit Association Luncheon

Suggested Topics:
1. Relation of Benefit Association to the Safety Department
2. The Scale of Benefits and the Rising Cost of Living
3. Basis for Fixing Dues
4. Re-insuring Risks Carried by Benefit Associations
5. How Employers Can Stimulate Membership by Giving Group Life Insurance to Those Joining
6. Dividing Cost Between Employer and Employee
7. How a Benefit Association May Promote Health Conservation

THURSDAY P. M., 5:00 O'CLOCK, ARENA, FIRST FLOOR

Moving Pictures on Safety

Note—Films will be announced in final edition of Congress Program

Freight Rates on Silica Sand Held Unreasonable

IN A REPORT on No. 10927, Silica Sand Producers' Traffic Association of Illinois vs. Chicago, Burlington & Quincy et al., opinion No. 6340, 58 I. C. C. 549-57, Commissioner Woolley held that rates on silica sand from the Ottawa district in northern Illinois to points east of the Illinois-Indiana state line, as compared with rates from Gray's Summit, Silica and Pacific, Mo., to the same destinations, subject sand producers in the Ottawa district to undue prejudice and disadvantage and give an undue preference and advantage to competing sand producers at the Missouri points mentioned. The Commission's order on that point requires the carriers, on or before December 14 to establish rates from Ottawa, Wedron, Millington and Oregon, Ill., to points east of the Indiana-Illinois state line which shall not exceed those contemporaneously maintained from Gray's Summit, Silica and Pacific, Mo., to the same points by more than the excess that would exist had the rates from the last-named points been increased in accordance with the permissive orders in the five and fifteen per cent cases.

A further holding was that the rate of $3.40 per ton from the Ottawa district to Charleston, W. Va., was unreasonable and unduly prejudicial to the extent that it exceeded the rates to Pittsburgh, Pa. A third holding was that a rate of $2.30 a ton from the same district to Cincinnati, O., was unduly prejudicial to the extent that it exceeded the rate to Evansville, Ind. The rates to Charleston, W. Va., and Cincinnati, O., are to be brought into line with the Commission's decision on or before December 14.—"Traffic World."

New Lime Bulletins Issued

UNDER THE TITLE of "Equivalent Strength of Liming Materials" appears a new trade bulletin, No. 101, of the Agricultural Department, National Lime Association. It describes the several market forms of agricultural limes with reference to theoretical composition, physical properties and practical relative strengths as ordinarily found on the market.. Special attention is given to properties affecting their availability in the soil, such as fineness and chemical form. The interrelation between concentration of liming material and economy is touched on. In this connection are set forth the fundamental principles to be observed in an intelligent selection of lime for use on the soil. The bulletin is illustrated by chart and carries a frontispiece of significant meaning.

A second trade bulletin, No. 103, "Beneficial Effects of Lime on the Soil," treats of the relation of lime to soil improvement and profitable crop production, and the role of lime in successful legume growth is well presented.

Senate Committee Defers Western Trip

THE SENATE COMMITTEE which is investigating conditions in the construction industry will not hold hearings in the Western cities until after the national election, according to Washington reports. Senator Calder, chairman of the committee is much interested in the special session of the New York State Legislature where housing legislation in all its phases is bound to be discussed, and it is understood that he wishes very much to keep in touch with the New York state developments, in the hope that the legislature will take advance action which may suggest a national line of proceedure.

General News from Rock Product Markets

Storage for Limestone and Phosphate Rock

MANY FARMERS in Illinois have been much interested in the use of limestone and raw rock phosphate on their farms. One of the factors that has prevented the more extensive use of these materials is the lack of storage facilities. If both limestone and raw rock phosphate could be secured at the farmer's local trading point, it would be possible for him to haul a load of either of these materials home when he brought a load of produce to town.

A meeting was recently held at Galesburg, Ill., to consider ways and means for providing these storage facilities. About 10 different plans were presented. Each plan was discussed in detail and the estimated cost given. The type which is being erected quite extensively in Kankakee County, Ill., is meeting with a good deal of favor. This is a double silo type and costs approximately $5,000 for a 600-ton storage capacity. The 16th one of these bins is now being erected in Kankakee County, indicating that the farmers of that community consider limestone and phosphate very valuable fertilizers. Other types of storage plants were also discussed. One that met with particular favor would cost about $2500 and would provide for a 125-ton-storage.

St. Louis Resumes Sale of Cement, Sand and Gravel

SALE OF CEMENT, lime and sand which was discontinued Aug. 4 by the 37 members of the St. Louis Material Dealers' Association on account of a strike of 110 teamsters, has now been resumed.

As is known, the warehouses of the companies belonging to the association have been closed 36 days, and in that time the city, contractors and individuals requiring cement, lime and sand in the construction of concrete work, have been unable to get any from members of the association, although they volunteered to make their own deliveries. Union dealers asserted that dealers had adopted this action as a retaliatory measure directed against the public in order to force a settlement with the teamsters without having to recognize the union.

Indiana Sand and Gravel Men Want Equal Allotment of Open-Top Cars

THE INDIANA Sand and Gravel Producers Association has filed a petition with the public service commission against alleged discrimination in the distribution of open top freight cars in Indiana. Members of the association object to the railroads applying preferential orders of the interstate commerce commission to intrastate traffic. Special preference in supplying cars for interstate shipments has been given to coal mines by the commission.

The petition states that before the war the annual shipment of sand and gravel in Indiana exceeded 90,000 cars, or more than 4,000,000 tons, 75 per cent of which was shipped to points in this state.

Shipment of the product has been restricted, the petition declares, because of the order of the interstate commerce commission, giving priority to shipment of coal in open-top cars.

The Indiana men in the industry are waiting patiently for the public service commission to take some action regarding intra-state rates. Though the hearing was held some weeks ago the commission has never intimated what the result will be. The commission has refused to grant any increase in passenger rates, but many in the industry believe this is a certain indication that the freight increase, or the large portion of that asked in the petition will be granted. Some take the attitude that the passenger increase was not granted because it affected practically all the people in the state and that because the freight rate increase would affect only those in business there would not be the "howl" go up and in order to give the railroads some increased revenue they will be allowed to increase freight rates. A consensus of opinion in the industry would place the increase at about thirty per cent instead of forty as asked by the carriers.

Want Equal Distribution of Cars for All Road Building Materials

AN INTERVENING PETITION asking that "stone and cement and all other road building material receive the same consideration and equitable distribution of open top cars and box cars asked for in the petition of the Indiana Sand and Gravel Producers' Association," has been filed with the public service commission by L. H. Wright, director of the Indiana State Highway Department, for the highway commission.

Mr. Wright avers in his petition that in 1919 the commission let contracts for the construction of 135 miles of hard surface road on the main highways of the state; that the construction has proceeded to the point where practically all of the road has been graded and now is in a condition making it impossible for public travel; that unless the contractors can get relief by procuring cars to ship their material the greater part of the mileage will remain impassable through the winter and spring; that approximately $1,000,000 of contracts for bridges have been let, and require the transportation of cement, stone, steel, sand and gravel; that some of the bridges are dangerous and need immediate repair.

Increased Freight Rates on Road Materials in New York Suspended Until October

THE PUBLIC SERVICE COMMISSION of New York has suspended until October 15 the operation of increased freight rates in that state applying to sand, gravel, crushed stone, slag and cement, in order to give the commission time to investigate and determine the reasonableness of the new rate.

This action resulted largely from the activities of the State Highway Commission and road builders who greatly opposed the increase in rates on materials necessary to road construction and maintenance. The action of the Public Service Commission will require the railroads to justify the necessity for the 40 per cent advance on this class of construction materials.

Government Tests of Marble

IN ITS TESTS of 52 different types of marbles, the United States Bureau of Standards has the compressive strength of the dry material between 7,850 and 50,250 lbs. per sq. in. Wet specimens were usually somewhat weaker, and in a few instances loss from soaking was as great as 25 per cent. After 30 freezings and thawings, most specimens were much weakened, though some were little affected, while a few were actually strengthened. The electrical resistance varies so greatly that care is necessary in selecting material for switchboards. Marbles expand irregularly on heating and part of the increase is permanent.

Oil Shale in New Mexico

ACTUAL operation of retort plants for the treatment of oil shales is soon to be a reality, according to E. W. Hartman, president of the United States Producers Refining Co., Alamogordo, N. M., which has installed one of the largest plants of the kind in the country at Santa Maria, Calif. It is predicted that there are 25,000,000 barrels of oil in the known shale formations of these mountains which will average 40 to 75 gallons of oil to the ton. This can be produced at a cost of about 80 cents per barrel. The by-products obtained from the shale such as gas utilized for power will more than pay expenses of operating the plant.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Bound Brook, N. J.	1.80	2.25	2.00	1.80	1.60	.....
Buffalo, N. Y.	1.40 per net ton, all sizes					
Burlington, Vt.	1.00	.....	2.50	2.00	2.00	.....
Chaumont, N. Y.	1.75	1.75	1.75	1.50	1.50	1.50
Coldwater, N. Y.	1.80	1.80	1.80	1.65	1.65	2.00@2.25§
Grove, Md.	1.45	2.50	2.40	2.00	1.60	1.45
North Leroy and Akron, N. Y.	1.00	1.00	1.00	1.00	1.00	1.00‖
Utica, N. Y.	1.00	All other sizes 1.50				
Vernoy, N. J.	2.00	2.25	2.00	1.80	1.60	.....
CENTRAL						
Alden, Ia.	1.00	.....	1.50	1.45	1.45	.....
Alton, Ill.	2.50	.....	2.00	1.75	.....	.....
Bettendorf, Ia.	All sizes, 1.75 cu. yd.					
Buffalo, Ia.	.90	1.35	1.45	1.25	1.25	1.35
Chicago, Ill.	1.58	1.90	1.70	1.58	1.58	1.58
Cincinnati, Ohio	.....	**2.00**	**2.00**	**2.00**	.....	.....
Cleveland, Ohio	.....	**2.40**	**2.20**	**2.20**	.....	.....
Columbia, Ill.	2.15	1.90	2.00	2.00	1.90	1.90
Davenport, Ia.	**1.50***	**1.50***	**1.50***	**1.50***	.....	.....
Dundas, Ont.	.75	1.50	1.50	1.35	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	.....
Elmhurst, Ill.	**1.00@1.25**	**1.00@1.25**	**1.00@1.25**	**1.00@1.25**	**1.00@1.25**	**1.00@1.25**
Ft. Wayne, Ind.	**1.60**	**1.90**	**1.90**	**1.80**	**1.60**	**1.60**
Greencastle, Ind.	1.25@1.50	1.35	1.25	1.10@1.20	1.10	1.10
Hull, Canada	**2.50**	**2.30**	**2.50**	**2.10**	**2.00**	**1.75**
Illinois, Southern	**2.00**	**1.50**	**1.50**	**1.50**	**1.50**	.....
Kansas City, Mo.	.60	2.00	.....	.....	.....	.....
Kokomo, Ind.	1.10	1.10	1.25	1.20	1.10	1.10
Lannon, Wis.	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**	**1.25**
Lima, Ohio	1.70	1.60	1.50	1.50	1.50	1.50
Linwood, Ia.	1.00	.....	1.45	1.25	1.25	.....
Mansfield, Ohio	**1.70**	**2.20**	**2.00**	**1.90**	**1.70**	**1.70**
Mayville, Wis.	.95@1.00	.....	1.20	1.20	1.20	1.20
Montrose, Ia.	1.25	1.80	1.80	1.70	1.70	.....
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.25	1.25
St. Louis, Mo.	**.60**	**1.60**	.....	.....	.....	.....
Stone City, Ia.	.80	.....	1.60	1.80	1.40	.....
Toledo, Ohio, f. o. b. cars	1.85	2.10	2.10	2.10	1.85	1.85
Toronto, Canada	1.55	2.25	2.25	2.25	2.05	2.00
Winnipeg, f.o.b. cars	**2.90***	.....	**3.25***	**2.90***	.....	.....
SOUTHERN:	These prices include 90c freight					
Cartersville, Ga.	2.50	2.50	2.50	2.75	2.75	2.50
Chickamauga, Tenn.	**1.50**	**1.75**	**1.75**	**1.75**	**1.75**	**1.75**
Columbia, S. C.	1.00	3.75	.....	3.50	.....	.....
El Paso, Tex.	**1.00**	**1.00**	**1.00**	**1.00**	.....	.....
Fort Springs, W. Va.	1.75	2.00	1.90	1.80	1.60	1.50
Garnett, Okla.	.65	.....	1.75	1.75	1.60	.....
Mascot, Tenn.	.....	**1.50**	**2.00**	.....	**1.50@2.00**	.....
New Braunfels, Tex.	**.60**	**1.75**	**1.75**	**1.50**	**1.50**	**1.50**
WESTERN:						
Atchison, Kans.	.50	.....	2.10	2.10	2.10	.....
Blue Springs and Wymore, Neb.	.20	1.95	1.95	1.85@1.90	1.75@1.80	1.70
Kansas City, Mo.	**.60**	**2.00**	.....	.....	.....	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50
Terminous, Calif.	.....	**1.00**	.....	.....	**.90**	.....

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.80	1.75	1.65	1.45	1.25	.....
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Bound Brook, N. J.	2.10	2.30	2.00	1.85	1.70	.....
Dresser Jct., Wis.	.75	2.45	2.45	2.15	2.00	2.00
Duluth, Minn.	1.00	2.50	2.00	1.50	1.50	1.50
E. Summit, N. J.	2.10	2.35	2.15	1.80	1.85	.....
Glen Mills, Pa.	1.00	1.35	1.70	1.55	1.35	1.35‖
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	.....
San Diego, Calif.	.....	1.30@1.60	1.25@1.55	1.15@1.45	1.10@1.40	.....
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	.....
Richmond, Calif.	.50	.....	1.50*	1.50*	1.40*	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**	**1.10**
Middlebrook, Mo.—Granite	4.00	.....	2.00	.....	.....	**1.50‡**
Portland, Maine—Granite	**1.50**	.....	.....	**1.35**	**1.25**	.....
Roseburg, Ore.	.....	**1.50**	**1.25**	**1.05**	**1.00**	**1.00**
Stockbridge, Ga.—Granite	**.50**	**2.00**	**1.90**	**1.75**	**1.75**	.....
White Haven, Pa.—Sandstone	**.85**	**1.20**	**1.40**	**1.20**	**1.20**	**1.20‖**
Granite	1.25	.....	1.50	1.50	1.50	.....

*Cubic yard. †Agrl. lime. ‖R. R. ballast. §Flux. ‡Rip-rap. a 3-inch and less.

Agricultural Limestone

EASTERN:

Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$—70% thru 200-mesh, 95% thru 40-mesh; bags, $5.00; bulk **3.25**

Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); sacks, 4.00; bulk **2.50**

Gasport, N. Y.—50% thru 50 mesh 3.25

Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 5.50; bulk 4.50

Grove, Md.—(50% thru 50 mesh); paper bags, 6.75; bulk **5.00**

Hillsville, Pa.—Analysis, $CaCo_3$, 96% (70% thru 100 mesh); sacks, 5.00; bulk 3.25

Jamesville, N. Y.—68% thru 100 mesh; 95% thru 50; 100% thru 20. Sacks, 3.75; bulk 2.25

Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk 2.75

Walford, Pa.—(70% thru 100 mesh; 85% thru 50; 50% thru 50; 100% thru 4); sacked, 4.25; bulk **2.75**

West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk **2.85**

Williamsport, Pa.—Analysis, $CaCo_3$, 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); sacks, 5.50; bulk 4.00

CENTRAL:

Alden, Ia.—Analysis, $CaCo_3$, 99.16% ..... .80

Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—50% thru 4 mesh 2.50

Bedford, Ind.—(95% thru 10 mesh) Analysis, $CaCo_3$, equivalent 98.5% 2.00

Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk 2.50

Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh 1.00

Columbia, Ill., near East St. Louis (⅛-in. down) ..... 1.25@1.80

Elmhurst, Ill.—(Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh 1.25

Greencastle, Ind.—(Analysis, $CaCo_3$, 98%) 50% thru 50 mesh **1.75**

Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100 ..... **2.75@3.00**

Kansas City—(50% thru 50 mesh) **2.00**

Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$ **2.00**

Marblehead, O.—(Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 5.25; bulk 3.00

McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04%—100% thru ⅛-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100 ..... **1.50**

Milltown, Ind.—Analysis, $CaCo_3$, 93.10%; $MgCo_3$, 3.20%—(70.8% thru 20 mesh) 1.65

Montrose, Ia.—(90% thru 100 mesh) **1.25**

Piqua, O.—Analysis: $CaCo_3$, 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh; bulk, 3.50; paper sacks **5.50**

Rockford, Ill.—Analysis, $CaCo_3$, 54%; $MgCo_3$, 42% 1.25

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ¼" mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82% **2.00**

St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12% **1.50**

Stone City, Ia.—Analysis, $CaCo_3$, 98% (50% thru 100 mesh) ..... **.80**

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen) **1.80**

Whitehill, Ill.—Analysis, $CaCo_3$, 96.12%; $MgCo_3$, 2.50%—
50% thru 100 mesh 2.25
90% thru 100 mesh 5.00

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96% combined carbonates—All thru 10 mesh with all dust in 3.00

Claremont, Va. (Marlime) — Analysis, 90.94% $CaCo_3$, 0.31% P., 1.36% Mg., 0.37% K.; bulk 4.50
100 lb. ppr. bags 6.00
100 lb. cloth bags 6.50

Dittlinger, Tex. — Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%.
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh.... 3.00

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk 2.00

Knoxville, Tenn.—Pulverized..... 2.50
90% thru 100 mesh..... 3.00

Linnville Falls, N. C. — Analysis, $CaCo_3$, 53%; $MgCo_3$, 42%—50% thru 100 mesh; sacks, 4.50; bulk..... 3.00

Marion, Va. — Analysis, 90% $CaCo_3$—(50% thru 100 mesh)..... 2.00

Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%); average price, ⅛ in. down..... 2.00

Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.
(80% thru 100 mesh) 3.00
(All thru 10 mesh) 2.50
(80% thru 200 mesh) 5.00
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Mountville, Va.—Analysis, $CaCo_3$, 76.6%; $MgCo_3$, 22.83%—100% thru 20 mesh; 100 lb. ppr., 7.00; bulk..... 5.00

Ocala, Fla. — Analysis, $CaCo_3$, 98%—(75% thru 200 mesh) 4.50

Tyrone, Ky.—Analysis, $CaCo_3$, 90%; $MgCo_3$, 4%—90% thru 4 mesh..... 1.75@2.25

WESTERN:

Cement, Calif.—Analysis, $CaCo_3$, 95%; $MgCo_3$, 2%—(50% thru 50 mesh)..... 5.00

Colton, Calif.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1½% (all to pass 14 mesh)—bulk, 3.50; bags..... 4.50
Sacks, 15c extra, returnable.

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk..... 1.35

Terminous, Calif.—Analysis, 94% $CaCo_3$, 1.4% $MgCo_3$—(60% thru 200 mesh; 90% thru 100 mesh; 100% thru 40 mesh); sacks, 6.00; bulk..... 5.25

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va..... 2.75@3.25
Bridgeton, N. J.—Washed, 2.50; dried 3.00
Cedarville and South Vineland, N. J.—Damp, 2.00; dry 2.50
Columbus, Ohio ..... 2.50@3.00
Gray Summit, Mo. ..... 2.50@3.00
Guion, Ark.—Carlots 2.50
Hancock, Md.—Damp 2.00
Klondike and Pacific Mo..... 2.50@3.00
Mapleton, Pa.—Dry 4.00
Glass, damp 3.00
Massillon, Ohio 3.50
Millington, Ill. ..... 2.25@3.00
Mineral Ridge, Ohio 4.00
Montoursville, Pa.—Green, washed..... 2.00@2.75
Morgantown, W. Va..... 2.50@3.00
Oregon, Ill.—Large contracts..... 2.00@2.50
Ottawa, Ill. 2.50
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Robinson, Md.—Washed, damp 2.00
Rockwood, Mich. ..... 3.00@4.00
St. Marys, Pa.—Green..... 2.50
Sands, Elk Co., Pa.—Selected, green.. 3.00
Thayers, W. Va.—Washed..... 3.00
Tygarty, Ky.—Washed, not dried..... 2.60
Utica, Ill. ..... 1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—Core..... 2.00
Molding fine and coarse..... 3.00@3.50
Sand blast ..... 6.00@8.00
Brass molding ..... 3.00@4.00
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse 1.50
Arenzville, Ill.—Molding fine..... 1.80@2.25
Beach City, Ohio—Core..... 3.00@3.50
Furnace lining ..... 3.00@3.50
Molding fine and coarse..... 3.00@3.50
Sand blast ..... 3.50@4.00
Bowmantown, Pa.—Core ..... 1.35@1.50
Molding, coarse ..... 2.00@2.40

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.	.....	1.30	.....	1.30	1.00	1.00
Attica, N. Y.	.75	.75	.75	1.00	1.00	1.00
Farmingdale, N. J.	.48	.48	1.70	1.35	1.40	.....
Hartford, Conn.	.90	.....	1.25	1.15	1.15	1.15
Leeds Junction, Me.	.....	.50@ .60	1.75@2.00	1.50	.....	1.35
Ludlow, Mass.	.75*	.75*	1.70	.....	1.50*	1.50*
Washington, D. C.	.75	.75	2.00	1.40	1.20	1.20
York, Pa.	.....	1.20@1.30	(crushed gravel)			
CENTRAL:						
Alton, Ill.	.60@ .75	.60@ .75	1.50@4.50	1.30	1.20	1.20
Anson, Wis.	.....	.60@ .70	.....	1.25@1.50	.....	1.00@1.15
Attica and Covington, Ind.	1.00	1.00	1.00	1.25	1.25	1.25
Barton, Wis.	.....	.70	.80	.....	.80	.....
Chicago, Ill.	.....	1.75@2.25	1.95@2.45	1.75@2.25	.....	.....
Cincinnati, O.	2.05	2.00	2.00	2.00	2.00	2.00
Columbus, Ohio	.70	.70	.70@1.00	.70@ .80	70@ .80	.70
Des Moines, Ia.	1.00	.75	1.65	1.65	1.65	1.65
Earlestead (Flint), Mich.	.60	.70	.....	1.05	.95	.95
Eau Claire, Wis.	.60	.60	1.35	.....	1.10	.....
Elgin, Ill.	.....	.80	1.00	.80	.80	.80
Elkhart Lake, Wis.	.75	.60	1.00	.84	.84	.84
Grand Rapids, Mich.	.60	.60	.....	.90	.85	.85
Greenville, Mechanicsburg, O.	.80	.70	.80	1.00	.85	.80
Humboldt, Ia.	1.00	.85	1.90	1.90	1.90	1.90
Indianapolis, Ind.	.60	.60	.....	1.50	.75	.75
Janesville, Wis.	.....	.65	.....	.....	.75	.....
Mason City, Ia.	1.00	.90	2.00	1.85	1.85	1.75
Milwaukee, Wis.	1.50	1.50	1.60	1.60	1.60	1.60
Minneapolis, Minn.	.50	.50	2.00	1.75	1.50	1.50
Moline, Ill.	1.00	1.00	1.60	1.50	1.40	1.30
Oxford, Mich.			(60-40 mix, .95 per ton)			
Pittsburgh, Pa.			(Sand, 1.30; gravel, 1.00)			
Saginaw, Mich., f. o. b. cars.	1.30	1.30	2.20	1.95	1.85	1.85
St. Louis, Mo., f. o. b. cars.	1.55	.....	1.75	1.55	.....	4.50
Summit Grove, Clinton, Ind.	1.00	1.00	1.00	1.00	1.00	1.00
Terre Haute, Ind.	1.00	1.00	.....	.....	1.25	1.00
Toledo, Ohio	.75	.75	.....	.....	.....	.....
Winnipeg, f. o. b. cars			2.00 per cu.yd.			
Yorkville, Moronts, Oregon and Sheridan, Ill.	.70@ .85	.70@ 90	.90	.80@ .90	.80@ 90	.80
SOUTHERN:						
Flomaton, Ala..	.....	.85@1.00	.....	.....	.....	2.00@2.50
Knoxville, Tenn.	1.25	1.25	1.65	1.65	1.65	1.50
Lake Weir, Fla.	.....	.75	.....	.....	.....	.....
Lincoln, Neb.	.90	.90	2.20	2.20	.....	.....
Macon, Ga.	.....	.75@1.00	.....	.....	.....	.....
Memphis, Tenn.	1.40	1.40	1.50	.....	.....	1.50
N. Martinsville, W. Va.	.....	1.40	.....	.....	.....	1.20
New Orleans, La.	.....	1.40*	3.00*	.....	.....	.....
Pelzer, S. C.	.90	.....	.....	.....	.....	.....
Pine Bluff, Ark.	1.25	.95	Concrete gravel, all sizes, 2.00			
Roseland, La.	.....	.35	.....	.....	1.25	.....
Tulsa, Okla.	.....	.70	.....	.....	.....	.....
Waco, Texas	.70@ .80	.70@ .80	.....	.....	.....	1.10
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.		(Kaw River sand, car lots, .75 per ton, Missouri River, 1.50)				
Niles, Calif.	1.00	1.00	.90@1.10	.85@1.00	.85@1.00	.85@1.00
Pueblo, Colo.	1.00	.90	.....	.....	.....	2.00
San Francisco, Calif.	.....	1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Saratoga, San Jose, Calif.	.....	.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Vancouver, B. C.	.....	1.30*	.....	1.30*	.....	1.20*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@ .85	.60@ .85	.....	.90	.90	.90
Fishers, N. Y.	.85@1.00	.....	.....	.....	1.00	.....
Hartford, Conn.	1.00*	.....	.....	.....	.....	.....
Yardville, N. J.	.....	.50@ .75	.....	.....	.....	.....
York, Pa.	.....	1.20@1.30	(crushed rock sand)			
CENTRAL:						
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.85	.85	.85	.85	.85	.85
Cherokee, Hawarden, Ia.	.....	.80 per ton—1.20 washed				
Des Moines, Ia.	.....	Washed con. mix., 25% gravel, 1.00; 50% gravel, 1.20				
Earlestead, (near Flint, Mich.)		.60 per yd.				
Elkhart Lake, Wis.	.....	.75 per ton (washed concrete material)				
Ft. Jefferson, Mechanicsb'g, O.	.70	.60	.60	.....	.....	.....
Greenbush, Mich.	.65	.....	.....	.....	.....	.....
Hersey, Mich.	.....	.....	.70	.70	.70	.....
Janesville, Wis.	.....	.65	.....	.....	.75	.....
Lincoln, Neb.		Sand gravel mix, 1.30				
Oxford, Mich.		Including cobbles, $1.00 per yd.				
Saginaw, Mich., f. o. b. cars.	.....	.75	1.30	1.30	1.30	1.30
St. Louis, Mo., f. o. b. cars.	.....	.....	.....	.....	.....	1.65
Summit Grove, Ind.	.65	.65	.65	.65	.65	.65
Toledo, Ohio	.....	.....	.....	.....	.75	.....
Yorkville, Oregon, Moronts and Sheridan, Ill.	.....	.75@ .85	.....	.....	.70	.....
SOUTHERN:						
Albany, Ga.	.70@1.00	.....	.....	.....	.....	.....
Dudley, Ky. (Crushed Sand)	.....	1.15	.....	1.10	.....	.....
Lindsay, Tex.	.....	.....	.....	.50	.....	.....
Valde Rouge, La.	.....	.....	.....	.....	.....	60@ .75
Waco, Texas	.....	.....	.....	.....	.....	.95
WESTERN:						
Saratoga, San Jose, Calif.	.....	.60@ .75	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ore.	.....	40	.....	.....	40	.....
Seattle, Wash.	1.25	1.25	2.00	1.25	.....	1.25

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	⅜ inch and less	½ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.10	2.50	1.35	1.35	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	.90	1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and Struthers, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, $1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ensley, Ala.	2.05	1.00	1.10	1.25	1.25	1.00	.95
Ironton, Jackson, O.	2.00	1.35	1.70	1.35	1.35	1.35	1.35
Toledo, O.	2.62	2.12	2.37	2.37	2.37	2.12	2.12
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00		1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.			98	38	8.00
Bellefonte, Pa.	11.00		95.5	.72	11.50
Berkeley, R. I.			50	18	15.00
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	10.50		45.50	30.50	13.00
Chippewa, Pa.	6.50@7.00		78.67	1.33	
Farnams, Mass	6.50	8.00	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.	6.00		85	2	8.00
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	8.00	10.75			10.75
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Mt. Union, Pa.	6.25		93.69		
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.25	11.00	84-87	2-3	11.00
West Rutland, Vt.	5.50	8.00	68	3	
West Stockbridge, Mass.	3.35	5.35			12.00
York, Pa.	10.50		96.31	2.73	13.00
CENTRAL:					
Alton, Ill.	12.00		97.0		
Delaware, O.			50.0	12	13.50
Knowles and Valders, Wis.	4.00	9.00	55	45	13.00
Manistique, Mich.	11.00		95	2	11.00
Marblehead, O.					13.00
Mitchell, Ind.					13.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Woodville, Ohio	10.50		54	45	13.00
SOUTHERN:					
Blowers, Fla.	5.50	8.00	98.0		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Claremont, Va.	5.00	7.00	85-95	2-5	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	11.00		97.82	0.12	
Knoxville, Tenn.	3.00				14.00
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	6.50		84		6.50
Newala, Ala.	8.10		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	9.00	11.50	80.00	15.00	
WESTERN:					
Colton, Calif.	15.00		97	2	
Kirkland, N. Mex.	12.50				
San Francisco, Calif.			96	0.33	15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands

(Continued from preceding page)

Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	2.00@2.50
Brass molding	2.00@2.50
Molding fine	2.00@2.50
Core	1.25@1.50
Columbus, O.—Core	1.00@3.00
Brass molding	3.50@4.00
Glass sand	3.00
Molding fine and coarse	3.00
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding, coarse	1.90
Brass Molding	2.15
Eau Claire, Wis.—Core	.60@ .70
Sand blast, wet	1.75@2.25
Sand blast, dry	3.00@3.50
Traction	.60@ .70
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Core	3.00
Molding fine	3.00
Molding coarse	3.00
Sand blast	5.00
Greenville, Ill.—Molding coarse	2.00@2.25
Guion, Ark.—Molding	2.50@3.00
Roofing	3.00
Stone sawing	2.50
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.80
Klondike and Gray Summit, Mo.—Molding fine	2.00@3.00
Lake Weir, Fla.—Sand blast	.60
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, moulding, fine and coarse, dry	3.00
Massillon, O.—Molding fine	3.00
Core	3.00
Molding coarse	3.00
Traction	3.00
Furnace lining	3.50
Michigan City, Ind.—Core, bank	.75@1.00
Millington, Ill.—Core and furnace	2.25@3.00
Core, washed	2.25@3.00
Mineral Ridge, O.—Core, molding, sand blast, roofing, etc., washed, screened (damp)	3.00
Montoursville, Pa.—Core and traction	1.50@2.00
Brass molding, fine, core	1.75@2.25
New Lexington, O.—Molding fine	3.50
Molding coarse	3.00
Oregon, Ill.—Core, furnace lining, molding fine, brass molding	2.50
Sand blast, molding coarse	3.50
Ottawa, Ill.—Crude silica sand	1.25@1.50
Ottawa, Ill.—Core, furnace lining, roofing	2.50
Sand blast	5.00
Glass sand	3.50@4.00
Stone sawing	2.00
Providence, R. I.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.25
Sand blast	3.00@4.00
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
Rockwood, Mich.—Molding, roofing, stone sawing	3.00@4.00
Sand blast	3.50@4.00
Thayer, Pa.—Traction	2.25
Furnace lining	1.25
Molding	1.50
Core, steel	2.25
Tygarty, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	2.00
Molding fine	2.50
Molding coarse, traction	2.50
Brass molding	2.50
Sand blast	3.50
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	3.00
Same, green	2.50
Wedron, Ill.—Core (crude silica)	1.00
Molding fine, coarse	1.00
West Albany, N. Y.—Molding fine	1.75@2.25
Molding coarse	1.50
Brass molding	1.75
Zanesville, Ohio—Molding	2.50@3.00

Crushed Gypsum

Castalia, O.—Crushed, to cement mills	4.00
Ft. Dodge, Ia.—Bulk	3.50
Grand Rapids, Mich.—Crushed gypsum rock	4.50
Gypsumville, Man., Can.—Crushed	3.50
Oakfield, N. Y.	4.00
Gypsum, O., and Akron, N. Y.	4.50@5.50

(Gypsum) Land Plaster

Castalia, O.—Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00.	
Garhutt, N. Y.—Land plaster, bags	8.00
Grand Rapids, Mich.—Ground gypsum rock	8.50
Oakfield, N. Y.—Ground Gypsum rock	8.00
Plasterco, Tex.	12.00
Sandusky, O.	6.00
Jute, 3.00 extra; ppr., 1.00 extra.	

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	9.00@10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 65%	8.25
B. P. L., 70%	9.00@10.00
Brown rock, 75% and better	12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	6.00
B. P. L., 65%	7.00
B. P. L., 70%	9.50
B. P. L., 75%	12.00
Lump rock, long ton, 70%	9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%)	
13% phosphorus	7.50@9.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	11.50
Norwills, Fla.—Fla. Hard Rock (B. P. L., 68%)	10.00
Wales, Tenn.—(B. P. L., 70%)	8.75

Florida Soft Phosphate

Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Phoslime, Fla. (in burlap bags)	15.00

General News from Rock Product Markets

The Magnesite Industry in 1919

THE PRODUCTION OF MAGNESITE in the United States in 1919 fell off about 30 per cent, but was nevertheless greater than in any year prior to 1917. F. McN. Hamilton, state mineralogist, estimates that California produced 42,000 tons of crude magnesite, or about one-half the production in 1918. According to R. W. Stone, of the U. S. Geological Survey, Department of the Interior, producers in the State of Washington shipped about 55,000 tons of dead-burned magnesite, which is equivalent to about 120,000 tons of crude magnesite, or 20 per cent less than in 1918. The output of crude magnesite in the country in 1919 was therefore about 162,000 tons. The material shipped from the State of Washington went to manufacturers of refractory wares and to steel mills east of the Mississippi River, except about 500 tons that was distributed in Montana, Washington, California and Texas. About three-quarters of the California material was calcined and used in the plastic trade and the remainder was natural ferromagnesite for making refractory materials. The report continues:

The large production indicated should be satisfactory and encouraging to the domestic producers, for even as late as June, 1919, it was expected that receipts of foreign magnesite would practically terminate the domestic industry. The imports, however, were not received as expected, and the demand for magnesite for refractory and plastic wares had to be supplied from domestic sources.

The Northwest Magnesite Co., of Chewelah, Wash., was the largest producer in the United States and made some shipments during each month in the year. Its shipments were smallest in May and June, but increased rather steadily to the end of the year, and are still large. The American Mineral Production Co., of Valley, Wash., sold its output crude to the Northwest Magnesite Co., whose quarries are near by. The Western Materials Co. took over the Double Eagle quarry, formerly operated by the Valley Magnesite Co., at Valley, Wash., and became a new producer in the state.

At the end of 1919 the principal producers in California were the Porterville Magnesite Co. and the Tulare Mining Co., at Porterville; the Western Magnesite Development Co., whose mine is on Red Mountain, in Santa Clara County, and the White Rock mine, in Napa County. Smaller operations in California were in progress on the property of the Dinuba Magnesite Co., Tulare County; the Gustine Magnesite Co., Santa Clara County; Sinclair & Ferguson, Fresno County, and possibly one or two others.

Imports

The imports of magnesite in 1919 reported by the Bureau of Foreign and Domestic Commerce comprised 6,381 short tons of crude magnesite, valued at $103,311, and 9,471 short tons of calcined magnesite, valued at $270,721, or a total value of $374,032. These imports came from the following countries:

	Short Tons	Value
Austria-Hungary	2,650	$ 64,933
Italy	2,416	62,753
Germany	34	2,023
England	29	4,849
Scotland	94	9,369
Canada	8,066	216,605
Mexico	2,563	13,500
	15,852	$374,032

Presumably the material reported from Italy came originally from Austria-Hungary, and that from Mexico came from Santa Margarita Island, and was calcined near San Diego. The imports in 1919, which amounted to less than 16,000 tons, were very small in comparison with those of former years. Grecian magnesite was not entered in 1919, and it is understood that none is likely to be imported for some time to come. The California magnesite must therefore continue to be used for the manufacture of Sorel cement, and as the value of this material for floors and for stucco on exterior walls becomes more widely recognized it would seem that some of the California deposits could be operated continuously and with profit. Unless the imports of magnesite suitable for making refractory material increase greatly, the domestic material suitable for refractory purposes—that is, the Washington magnesite and that from the White Rock mine in California—will continue to be used by domestic consumers, so that a fairly good year may be predicted for 1920.

Canada in Throes of Cement Shortage

ALTHOUGH THERE IS A BRISK DEMAND in Canada for cement, it is stated on good authority that the Canada Cement Co. has been seriously handicapped this year through lack of coal. This company, which is responsible for four-fifths of the output of portland cement throughout Canada, has been unable to operate its plants at anything like capacity owing to the non-receipt of coal which had been contracted for even at high prices. Not over 20 per cent of the company's requirements in coal has been delivered, and had it not been for the fact that 100,000 tons of coal and 1,000,000 barrels of cement were held in stock by the company at the beginning of the year, it is probable that the whole building trade of Canada would have been tied up. This has resulted in decreased sales, and a disappointing period for the company, for the mills have had to be operated at extraordinary costs owing to the irregular and small supply of coal. Important export markets in South Africa, West Africa, the West Indies and South America have practically been abandoned for the time being. So acute has become the situation with regard to cement that the Canada Cement Corporation, with a plant at Port Colborne, announces that it cannot guarantee to fill orders for the highway work in this district, and the Welland Ship Canal construction is likewise being held back. It may be necessary to close down work on the ship canal.

No Increase in Freight on Building Materials in Canada

BEGINNING September 13 freight rates in Canada will go up 40 per cent in the East and 35 per cent in the Western provinces except on such building material as sand, gravel and crushed stone. Freight on coal is increased from 10 to 20 cents per ton.

Labor Trouble Hurts Cleveland Building

LABOR TROUBLE, coupled with the railroad tie-up and the cost of material, has cut Cleveland's building for 1920 far below the figures for 1917, according to Commissioner Summerell.

From January to July of this year only 1,125 permits have been issued for a total estimated cost of $6,549,400. Last year's figures for the same period were 1,759 permits and $8,529,600 cost. July permits were only 157 as against 358 for the same period last year.

Canadian Feldspar Mines Get Better Railway Facilities

IT IS EXPECTED that a branch of the C. N. R. will be built from Westport into the township of Bedford, Frontenac County, for the benefit of the feldspar mines in that region. Some of the finest feldspar in the world comes from this country and better railway facilities are required. An effort is to be made to have grinding mills established on the Canadian side of the line, so that all the spar will not be shipped free of duty into the United States. Kingston has a tile works that used much feldspar, and the development of the mines is expected to be a great thing for that city.

General News from Rock Product Markets

Plan to Indict 250 Coal Men

WASHINGTON, D. C.—Indictments on charges of profiteering in the sale of coal this summer will be asked by the Department of Justice against 250 coal mining companies in Maryland and northern West Virginia, according to a special dispatch to the New York Sun. A special United States Grand Jury investigation will start at Martinsburg, W. Va., next Tuesday. The action is the first that the government has attempted under the profiteering sections of the Lever law.

Subpoenas for the production of all books and records of the companies relating to the costs of producing coal, and the prices at which it has been sold, have been issued by United States District Attorney Stuart W. Walker at the instigation of Attorney General Palmer. Two companies—the Silver Coal Mining Company of Beryl and the Hamill Coal and Coke Company of Blaine, in Mineral county, W. Va.,—have already been placed under bond, though they have not yet been indicted.

For more than two months agents of the Department of Justice, working under the personal direction of District Attorney Walker, have been making an investigation throughout Maryland and northern West Virginia relative to the costs of mine operation and the prices at which coal has been sold. The information that has been gathered covers virtually every ton of coal that was produced from April 1 to Aug. 1 in the Maryland and northern West Virginia fields, and the prices at which it was sold.

Grand Jury subpoenas have been served on nearly every mining company in the Elkins, Morgantown, Fairmont, Clarksburg and Wheeling districts, in West Virginia and in the Cumberland and Georges Creek fields in Maryland. Scarcely a company has been omitted in Taylor, Barbour, Upshur and Randolph counties in West Virginia, and covered by the Tygart Valley coal region.

Charges of profiteering by the coal producing companies in northern West Virginia were made before the Department of Justice as long ago as last May. Manufacturing interests and public utilities which sought to make contracts for the purchase of coal throughout the year complained that prices of $6 and $10 a ton were asked at the mines.

Investigation by agents of the Department of Justice is understood to have revealed that the costs of producing the coal by the mines has ranged from $2.50 to $4 a ton. Efforts of many consumers who have been dependent in the past on the Maryland and northern West Virginia fields for a supply of fuel to make contracts for the purchase of coal at prices approximately those of previous years, have resulted in failure in a large number of instances.

At the office of the Attorney General today the admission was made that inquiries by agents of the government are being made in other coal producing regions, but the names of the localities were not made public.

Freight Situation at Pre-War Level

WASHINGTON, D. C.—Railroads in the United States have practically attained the pre-war level of freight movement, and, there no longer exists an emergency necessitating governmental control of freight car movement.

This fact was stated by a high official, who predicted that within a very short time public acknowledgment of this fact would be made by the rescinding of the emergency order issued May 20 by the Interstate Commerce Commission, in which all existing rules and regulations governing the movement and routing of both empty and loaded freight and coal cars were suspended.

The prediction is based on the fact that reports by the Car Service Commission show that the movement of loaded freight cars during the week ending Sept. 4 was within 15,000 of the highest pre-war record, enabling the rescinding of the priority and preference order for coal for New England and the return to normal volume of railway employment.

That the normal volume of employment on the railways has been reached is clearly indicated by the priority order issued by the commission last week in which the words "aggravated by unfavorable labor conditions" were omitted in declaring the existence of an emergency.

During the week ending Sept. 4, according to reports reaching the Car Service Commission, the railroads of the country moved 985,000 cars of loaded freight. The highest record ever attained, even during the war, when the car movement was abnormal through the pooling of all facilities and establishment of priorities, was approximately 1,000,000 cars. It was said at the offices of the commission today that reports on the movement for the week ending Sept. 11, which are just coming in, indicate that the million mark may have been passed.

Officials also are jubilant over the fact that today there is practically no congestion of freight beyond the normal number of cars that existed even when transportation conditions were at their best.

On May 20, when the Interstate Commerce Commission issued its order suspending all existing rules and regulations, the congestion amounted to more than 288,000 loaded cars. On Sept. 4, the congestion had been reduced to 64,060 cars, which is within 20,000 of the lowest number ever existing on the railways. When the Government relinquished control of the railroads of the country on March 1, the freight car congestion, according to the report of the Director General of the Railroad Administration, was over 100,000 cars.

As the movement of freight cars becomes normal, however, the question of car shortage becomes more acute as the result of failure to keep up during the war years the number of additional freight cars that formerly were placed on the roads every year to replace worn out cars and take care of the increasing volume of freight.

The car shortage on Sept. 1 was estimated at 151,440 cars, with the normal volume of shipping two months away from the peak, which usually is reached about Oct. 15.

National Association Sand and Gravel Producers Meet in South

AT MEMPHIS, Sept. 21st, Mississippi, Arkansas and Tennessee members of the National Association of Sand and Gravel Producers held a meeting at the Chamber of Commerce, when officials of the national organization discussed before them some of the problems which in recent months have threatened the industry with demoralization. The meeting was presided over by V. O. Johnston, of Lincoln, Ill., president of the Association. E. G. Sutton, business manager of the national organization, was the principal speaker. He discussed the car situation and the advance in freight rates. He explained the preferential order recently granted by the Interstate Commerce Commission which permits the use of open top cars in the transportation of sand and gravel and other road building materials. He stated that this order had done much to relieve the situation and that at the present time contractors are enabled to secure sufficient material to carry on construction programs that have been begun.

This is but one of a series of meetings which are being held in the South for an increased membership. The meetings so far have aroused the keenest interest, and undoubtedly the membership campaign will be a success.

Passed By The Screens

Incorporations

The St. Lawrence Quarries, Gouverneur, N. Y., has filed notice of dissolution in New York.

The A. B. C. Sand and Gravel Co., Tulsa, Okla., has been incorporated for $10,000 by C. T. Smith, S. J. Wick, E. D. Rhodes, all of Tulsa.

The Reservoir Quarry Co., White Plains, N. Y., has been incorporated for $25,000 by C. W. Knowles, U. M. Austin and R. M. Hart, all of White Plains.

The Simplex Coal & Petroleum Co., Wilmington, Del., has been incorporated for $1,000,000 to mine and deal in coal, limestone, sand and other minerals.

The Sand, Gravel and Supply Co., Macedonia, O., has been incorporated for $15,000 by R. J. Anderson, W. E. Gregory, H. A. Kangesser, H. Sharpe and E. C. Scharff.

The Appleton Peat Products Co., Appleton, Wis., has been incorporated for $60,000 to manufacture fuel out of peat, by S. W. Murphy, C. C. Nelson and J. P. Frank (Att'y).

The Hampshire Road Improvement Society, Methuen, Mass., has been incorporated for $25,000 by Hebt. Waite, Pres.; Hebt. Schwarzenburg, Methuen, Treas., and Henry Graichen.

The Rock Hill Quarry Co., West Manayunk, Pa., has been incorporated for $35,000 to operate stone properties in this section. W. D. Bryson, Ridley Park, Pa., is treasurer of the company.

The Johnsburg Corp., Johnsburg, N. Y., has been incorporated for $5000 to engage in mining and quarrying by P. C. Whipp, F. C. Hooper and H. W. Williams, all of Glenn Falls, N. Y.

The Wausau Concrete Co., Wausau, Wis., has increased its capitalization from $25,000 to $100,000. The officers are C. W. Parsons, Sec'y and Treas., and I. J. Westerveld, both of Wausau.

The Wm. J. McCarthy Stone Co., Boston, Mass., has been incorporated for $15,000. The directors are Wm. J. Sullivan, 8A Melvin St., Somerville, Pres. and Treas.; Helen M. Clifford and Michael F. Culliney.

The National Fertilizer Co., St. Augustine, Fla., has been organized with a capital of $500,000. The company plans the erection of a factory for the production of fertilizers. The officers are as follows: I. B. Bussels, Pres.; S. B. Teakle, Vice-Pres.; D. N. Chadwick, Jr., Sec'y-Treas., all of Fernandina, Fla.

Silica Sand

The Augusta Silica Mining Co., Augusta, Ga., recently organized with a capital of $50,000 will develop a sand and gravel tract near the city. Dredging equipment and other machinery will be installed on the property, with the intention of producing about 15 carloads of material daily. D. W. Summers is president, and F. P. Farrar, secretary-treasurer.

North Bend, B. C., Can.—An industry recently established in British Columbia is the British Columbia Silica and Talc Co., who have been in operation for the past seven months and are employing from ten to fifteen hands in their plant. The quarries of this company are located at North Bend, B. C., approximately 125 miles east of Vancouver on the C. P. R. main line. About 5,000,000 tons of silica and talc are in sight, both practically pure in their natural state. At the present time the company is exporting 200 tons of silica per week to the United States.

Sand and Gravel

The McGrath Sand and Gravel Co. opened its fourth plant recently at Forreston, Ill. It is a large plant and is equipped with all modern machinery. The other three plants are located at Pekin, Mackinaw and Chillicothe, Ill.

The Lowell Sand & Gravel Co., Lowell, Mich., a new enterprise started recently by F. A. Godfrey and John O'Harrow has secured options on 331 acres of sand and gravel land at Irving, Mich. Tests which have been conducted on 70 acres show an average of 40 ft. of sand and gravel of excellent character giving a conservative estimate of 3,500,000 tons.

The Christiana Clay Products Co., Wilmington, Del., is expanding its property at Stanton, Del. In addition to brick manufacture, the company has developed a large sand and gravel deposit, and will install a modern washery at an early date.

Columbus, O.—In completing the work on its new plant in S. High St. the Immel Co. has uncovered a pit of sand and gravel with an estimated yield of more than 100,000 yards. Herbert R. Gill of the Island Sand and Gravel Co. and other experts called in to appraise the pit agree that it holds as good a grade of sand and gravel as can be found anywhere near Columbus.

Ozaukee County, Wis.—Ozaukee county is evidently trying to follow the custom of other counties in road building and has purchased gravel pits at Mequon and Cedarburg, Wis., and will furnish its own material for the future construction of highways in that county. A special meeting of the County Board of Supervisors of that county was held for the purpose of deciding the matter.

The Roquemore Gravel Co., Montgomery, Ala., has been organized and chartered under the Alabama laws with a capital stock of $250,000, to engage in the general sand and gravel business. The new concern has already arranged for the early installation of new and modern machinery and will be ready to operate within sixty days, according to J. D. Roquemore, president. Other officers are R. M. Hobbie, vice-president; W. E. Mathews, secretary and treasurer. The pits of the company are located on the main line of the Louisville & Nashville railroad near Montgomery. The plant will have an initial capacity of seventy-five carloads daily.

The Henderson Sand and Gravel Co., Henderson, Ky., is now constructing a new sand and gravel plant. A tipple has been erected from the road to the river front, and is expected to be in operation by Sept. 15, as the machinery will arrive about the 10th. An endless belt will carry the sand and gravel from barges on the river up the tipple, and deposit them in flat cars, which will be run directly under the stand supporting the belt. The plant when completed will have a capacity of 700 cubic yards or 1000 tons of sand or gravel per day, and will be far more efficient than the old method of loading and unloading by means of carts.

The Morey Sand-Gravel Co., Eddyville, Ia., held an informal meeting of its stockholders recently, and heard from the officers of the company the progress which has already been made and the plans for the future. Mr. Blanton, president of the company, has spent several weeks visiting with county officials and concrete contractors in the southern part of the state, making contracts for the glacial granite gravel produced at Eddyville in any quantity or size that the trade may desire. Secretary Earl Withrow stated that during twenty-one days when cars were available, over $7,400 in material was shipped and that orders now on the books unfilled for immediate delivery amounted to over 100 cars, with several contracts in sight for shipment.

The Hahn Muscatine Co., Muscatine, Ia., has resumed work on its gravel plant after two weeks' delay, due to the inability to obtain building materials. Everything entering into the construction of the plan is now on the road, however, the Hahn officials have been advised, and with favorable weather, the plant should be ready for operation on or about October 1. The new plant will be the largest plant on Muscatine Island, its dimensions measuring 85x120 feet, with the highest tower reaching 51 feet from the ground. It will be the only plant in this vicinity which can be operated during the winter, as a special heating apparatus will be installed to keep the plant's temperature above the freezing point. A barge on which the pumping machinery will be set up, has already been purchased, and arrived here last week from the tri-cities. The barge is now afloat in the river, but it must be moved overland from a point near the Muscatine waterworks plant on the Island levee to the gravel plant site on Stewart road. Owing to the size of the barge, which measures 126 feet long by 24 feet wide, this will prove quite a difficult undertaking. A Cedar Rapids moving firm has been engaged to move the barge overland between the two points, and the work will probably be started some time this week. It will require five days more to transport it to the new pit. As soon as the barge can be relaunched at the pits, work of setting up the pump and machinery will start.

McDuff Sand & Gravel Co. has been organized by Salt Lake, Utah, business men to develop a silica sand deposit north of Salt Lake. The active members of the new company are Bishop Harold A. Lamount and E. A. Charlton. Reports state arrangements have been made for the immediate erection of a $100,000 plant. The silica is said to be high grade, suitable for glass manufacture, furnace linings, etc. This company has operated a sand and gravel plant on the property for some months.

Cement

Ogden Portland Cement Co., O. C. Hart superintendent, Brigham City, Utah, is erecting a new cement plant near Pocatello, Ida., which is expected to be in operation early next spring. The main office of the company is located at 521 Eccles building, Ogden, with works at Bakers, Utah.

The Ash Grove Lime and Portland Cement Co., Chanute, Kans., recently had a fire in its coal-grinding mill. The blaze started off pretty briskly and the city fire department was asked to help. It responded promptly but by the time it reached the plant the company's employees had the flames almost whipped out. They are well equipped and well organized for fire fighting. The blaze was caused by a dust explosion, probably ignited by a spark from belting charged electrically. The flash set fire to the tarred paper roofing in spots and damaged belting. The damage was not sufficient to interfere with the operation of the cement plant.

Lehigh Portland Cement Co. of Allentown, Pa., has purchased the Henry Young farm in Hickory township, East of New Castle, Pa., the deal involving $85,000. The farm contains 120 acres, the greater part of which is underlaid with limestone, and is in the section now being worked by the Lehigh company's big mills at New Castle. Officials of the plant stated that the limestone on the farm will be used for manufacturing purposes. The stone will probably be quarried within a short time and be utilized when the present supply is exhausted, which it is expected will be in about 2 years, if the plant keeps up its present rate of operation.

Vancouver Island, B. C., Can.—During the past three or four years the market for British Columbia cement has been somewhat depressed. An indication of this is the fact that the plant of the British Columbia Cement Co., at Tod Inlet, Vancouver Island, the principal cement producing plant in the province, has, since 1915 been turning out about one-third of its capacity and operating only six months in the year. Only about one-tenth of the company's actual capacity output has been sold during the past four or five years, and, as a result, the company has been operating at a loss. Just recently the situation has been greatly changed, however, although whether permanently or not, it is not known. Within the past few months Australia, New Zealand, South America, the Fiji and Philippine Islands have commenced to bid for British Columbia cement, a development unheard of until the high cost of labor, shortage of fuel and transportation difficulties gave Vancouver Island a distinct advantage over other Pacific cement plants on account of its tide-water location and easy access to sea transportation.

Davenport, Ia.—Erection of the mammoth plant of the Western States Portland Cement Company on the north side of the railroad tracks at Nutting Station instead of south of the tracks is now expected, following the installation of a siding by the C. D. & M. interurban. The siding has now been completed and the first delivery of material for the big plant has been made. Two carloads of ties and one of rails were delivered last week. This material will be used by the Western States Company in building its private tracks. The property which the big Kansas concern purchased several months ago lies north and south of the D. R. I. & N. W. and C. D. & M. tracks at Nutting Station. It also extends to the Mississippi river, giving the company wharfage for barge line service. Since the land was purchased there has been considerable speculation as to which side of the railroad tracks the concern would erect its immense plant. Although no statement has been made by the company management the installation of the switch on the north side leads to the belief that the principal building will be in that portion of the tract.

Passed By The Screens

Quarries

The Bowling and Green River Quarries Co., Bowling Green, O., have changed their name to Bowling Green Quarries Co.

The Litchfield Limestone Co., Litchfield, Ill., has begun operations at the old Mike Cleary quarry, two miles east of Litchfield. This quarry was operated from 1855 to 1875 by the late Mike Cleary.

Oolitic, Ind.—Robbers blew open the vault in the office of the Indiana Quarries Co. at Oolitic, Sept. 3, and obtained between $200 and $300 in cash. The robbery was discovered by the janitor. An unsuccessful attempt was made by the thieves to blow open a large steel safe.

Canada Rock Products, Ltd., Hamilton, has taken out a Dominion charter with a capital of $24,000 to take over as a going concern the property of Rocsand Co., Ltd., of Hamilton. They have taken up an option on the property secured by A. S. Connolly, and will deal in sand, gravel, stone, brick, lime, etc., and will continue the manufacture of crushed stone, etc.

Jeffersonville, Ind.—Requirements of the government for crushed stone at the army quartermaster's depot here have stopped considerable road repair in this township. Thomas G. O'Neil who had a contract for crushed stone at Utica, was supplying a surplus to the county, but the government has now taken over the quarry and will not permit the company to use the material. The county commissioners assert that the roads between Jeffersonville and New Albany, which were being repaired were worn out chiefly by the government three-ton trucks which have hauled thousands of loads over them during the last year. No other rock is at present available.

Lime

Saginaw Lime & Stone Co., Saginaw, Ala., is electrifying plant, and changing the wood kilns into coal kilns. The plant is being improved generally.

Longview Lime Works, Longview, Ala., is installing a new hydration plant and improved air separator. The quarry is being changed and the plant electrified throughout.

Toronto, Can.—The Toronto Board of Control have approved the recommendation of Works Commissioner Harris that a mill for the production of limestone dust for asphalt paving be installed at a cost of $7,000.

The Dorchester Fertilizer and Lime Co., Cambridge, Md., have taken over Andrews & Skinner, Cambridge, Md., manufacturers of lime. Lloyd Webster is president and treasurer, and Ivy Andrews, secretary and manager.

Wellston Iron Furnace Co., Superior, O., is opening up a new lime mine, which will give the company an unlimited supply of limestone and clay for many years' operation. The limestone is a high grade calcite, containing 97 per cent carbonate of lime and 1 per cent of magnesia. The undercuttings of the stone, which is a high grade clay, will also be used for the manufacture of Superior Portland cement.

Alabama Lime Works, Ft. Payne, Ala., whose plant was destroyed by fire recently, has completely finished the rebuilding, and the plant is again turning out lime in quantities. According to H. B. Brock, president and general manager of the company, the capacity of the plant has been increased while rebuilding, so that the daily output is now one entire carload of lime. The lime works is a new industry in Ft. Payne.

The Pennsylvania Lime Products Co., 308 Chestnut St., Philadelphia, Pa., has about completed re-equipment of its plant at Bridgeport, Pa., installing electricity throughout for the manufacture of building lime. Electric motors have been installed throughout the plant in place of former steam appliances, and a tramway has been installed to carry the material to crusher and kilns. The kilns have been rebuilt and a new apartment house for the employees has been completed. The company has arranged for the installation of a lime hydrating plant, and a building for its manufacture. The officers of the company are G. D. Van Sciver, Pres.; J. L. Durnell, Vice-Pres.; H. D. Fry, Sec'y-Treas.; I. F. De Wan, superintendent of the plant.

Conshohocken, Pa.—The sections of Plymouth and Whitemars townships east of Conshohocken are rapidly developing into important lime centers with prospects of new industries being added in the near future. This is indicated by the purchase a few days ago by a corporation in process of formation, of the large farms of Miss Elizabeth Wilson and Joseph Supplee. These extensive tracts front on the Plymouth branch of the Reading Railroad and are said to be rich with lime deposits. Soundings guarantee limestone of good quality and in sufficient amount to guarantee the development of the land. Negotiations are also pending for the purchase of other tracts in the section. The lime industry in this section at present is being operated by the American Magnesia Company, E. J. Lavine Company, Cox Lime and Stone Company, Corson Lime Company and the Blue Bell Lime and Stone Company.

Gypsum Products

Ponca City, Okla.—Construction has started in northwestern Kay county near Dilworth on one of the largest plaster manufacturing plants in the state. The Chicago firm building the plant holds a lease on several hundred acres of rich gypsum deposits in this part of the state. The plant will cost $100,000 at the outset.

The Connecticut Adamant Plaster Co., New Haven, Conn., whose plant was destroyed by fire in July, have commissioned Richard K. Meade & Co., engineers and chemical experts, Baltimore, Md., to prepare plans for a new plant. The latter will be of fireproof construction, with steel buildings, and equipped with the most approved modern equipment.

Phosphate

Portland, Ore.—Five thousand tons of phosphate rock have been booked for movement from Paris, Ida., to Japan, through this port.

The Standard Phosphate Co., Baltimore, Md., will erect a $100,000 acid plant at Curtis Bay, Md. It will be 1 story high and of steel and concrete structure.

Concrete Products

The Badger Cement Tile Co. Sheboygan, Wis., has been incorporated for $30,000 by J. E. Curtis, A. F. Broker and Hugo Kaems.

The Cemite Cement Floor and Terra Cotta Co., Indianapolis, Ind., has been incorporated for $260,000 by E. T. Kellie, T. B. Buskirk, Jr., and A. E. Rose

The Ideal Concrete Products Co., Providence, R. I., manufacturers of cement building materials and blocks, is planning an addition to its present plant. The extension will be about 35x40 feet, and will give the company about 6,000 square feet of manufacturing space. Leon E. Danforth is president and treasurer.

The Wilson Concrete Products Corp., Lockport, N. Y., has erected a new plant equipped with a Besser Brick Machine, which has a capacity of 30,000 concrete bricks per 10-hour day. These bricks are being used for face brick and have given very satisfactory results, in fact they are superior to most of the present clay brick. They are tampered under 15-ton blow in steel molds, insuring a straight and perfect brick which stands 1930 pounds per square on crushing test and 485 on rupture test. They are steam cured which insures an even setting of the aggregate. In weight they average about five pounds which is lighter than shale brick. Masons who have used them say they can lay them faster than clay or shale brick. The factory is also equipped with a Dunn Automatic Tile Machine with a capacity of 1500 feet of drain tile, all sizes from 3 inches to 12 inches. A quantity of this product has been delivered to farmers in the surrounding country and has been pronounced a very fine product. Sewer and water pressure pipe will be the next product which the company will put on the market. The officers of the company are: Raymond Wilson, Pres.; Ed. E. Wilson, Vice-Pres.; C. E. Wilson, Sec'y-Treas., and Carl F. Stevenson, superintendent.

Retail Dealers

Franklin Cement Block & Supply Co., Newark, N. J., has been incorporated for $50,000. Theodore Hindenlang is legal agent.

The Roth Building Supply Co., Sheyboygan, Wis., has been incorporated for $50,000 to deal in all building materials and supplies by E. H. Roth, E. R. Fleischer and T. R. Kowalka.

The Charleston Cement Specialty Co., Charleston, S. C., has been incorporated for $5,000 by E. Field, J. Wimfinsinger, I. Wimfinsinger, H. C. Zogg, and F. M. Stambaugh, all of Charleston.

The Newcomer-Breeden Construction & Silo Co., Marshalltown, Ia., has been incorporated for $50,000 to manufacture silos and other forms of cement products. The officers are A. C. Newcomer, Pres.; C. F. Breeden, Vice-Pres. and Sec., and B. L. Carpenter, Treas., all of Marshalltown, Ia.

The Hudson Cement and Supply Co., Baltimore, Md., has purchased the plant of the Municipal Shale, Brick and Block Company, of Martinsburg, W. Va. The purchase was made from D. E. Tracy, of Harrisburg, for $75,000. The plant, which lies a short distance south of Martinsburg, has been operated by the Baltimore company since Mr. Tracy took control following the recent failure of the Martinsburg firm. Possession will be taken immediately and the plant will be devoted to the manufacture of brick and tile.

Personals

A. N. Johnson will leave the Portland Cement Association Oct. 1 to take up new duties as dean of the Engineering School and director of engineering research at University of Maryland, College Park, Md.

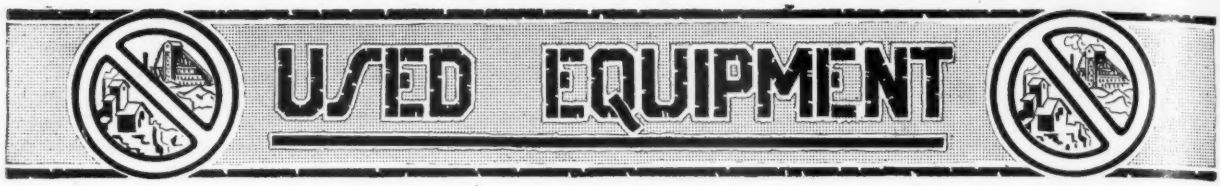
Richard Lieber, director of the state conservation department, has announced the resignation of B. J. Malott, assistant state geologist. Mr. Malott has accepted a position in the faculty of Technical high schools. L. S. Ferguson, who has been associated with Dr. G. N. Logan, state geologist, in field work, has been appointed assistant geologist. Mr. Ferguson is a graduate of Indiana university and specialized in geology.

Manufacturers

The London Concrete Mch'y Co., Ltd., London, Ont., has taken out a Dominion charter with a capital of $500,000 to take over the company of the same name operating under an Ontario provincial license.

The Jeffrey Mfg. Co., Columbus, O., announces the opening of a new branch office in Buffalo, at 1108 Marion Trust Bldg., which will be in charge of H. W. Scott, formerly of the home office. Mr. Scott has had long and successful experience in sales and engineering work for the company, which especially fits him to take care of the constantly growing demand for Jeffrey Products in his territory and render valuable assistance to clients, in handling of problems covering elevating, conveying, crushing, pulverizing, portable loading machinery, etc.

The C. G. Cooper Co., Mt. Vernon, O., at regular June meeting elected B. B. Williams president of the company to succeed D. B. Kirk, deceased. F. H. Thomas was elected vice-president to succeed Mr. Williams and N. L. Dany was elected treasurer to succeed Mr. Thomas. With its enlarged organization having such clearly defined lines of responsibility, the Cooper Co. is now doing an increasing volume of business and giving its customers even better service and satisfaction than ever before. The Chapman Engineering Co., the Chapman-Stein Furnace Co., and The Marion Die, Tool & Machine Co., with its well equipped plant at Marion, O., are subsidiaries of the Cooper Co., and are doing a thriving business. The complete service of the combined companies therefore now includes not only the well known line of Cooper gas engines and Cooper Corless engines, it covers also Chapman gas producers and Chapman-Stein furnaces. This complete combustion engineering service enters practically every line of industry, which utilizes gas for power or for industrial heat.



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1—Model 1 Thew, full revolving, on traction wheels.

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We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

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8—18-ton, 10x16" Porter Dinkeys, 36" gauge.

2—12-ton, 9x14" Porter Dinkeys, 36" gauge.

Clam Shell Buckets

1—1¼-yard Williams Hercules Bucket.

Cars

30—Western Air Dump 12-yard, standard gauge.

40—Western 4-yard, 36" gauge, steel beam.

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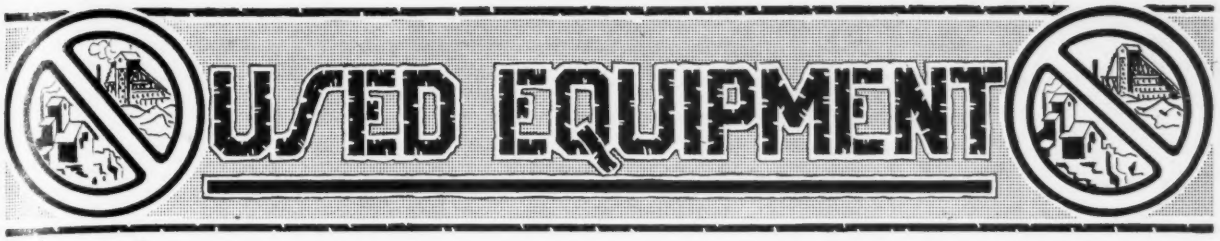

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24—1½ yard V shape 24" gauge Kopple cars, practically brand new; used less than one month.
12—Same as above with brakes.
12—1 yard V shape 24" gauge Kopple cars, excellent condition.
2—End dump Kopple cars, 18 cu. ft. capacity, 24" gauge.
2—Kopple 3'x5' flat cars, 24" gauge.
1—Kopple 24" gauge hand car.

CLAMSHELL BUCKETS

1—½ yard Standard.
6—¾ yard buckets following makes; Obenberger, Aden, Standard. Owen.
9—One yard buckets, following makes:
1 Owen, type L.
2 Owen, type E, one with teeth, one without teeth.
1 Heyward.
1 Mead Morrison.
2 O. & S.
1 Standard
1 Kiesler
2—Heyward, 1¼ yard.
2—Heyward Orange Peel, capacity ¾ yard.
1—Heyward Orange Peel, capacity 1 yard.

BOILERS

1—150 horse power locomotive type.
1— 75 horse power locomotive type.
1— 50 horse power locomotive type.
1— 25 horse power locomotive type.
21—Small Vertical Boilers from 6 H.P. to 12 H.P.

CRANES

1—12½ ton, 4 wheel Browning Locomotive Crane with 40 ft. boom, bucket operating, just like new.
2—15 ton, 4 wheel O. & S. Locomotive Crane with 40 ft. boom, bucket operating.
2—Byers Auto Cranes on traction wheels with 30 ft. boom, with or without buckets.

HOISTS

1—10x12 D/C 3 drum Lidgerwood with boiler.
1—9x10 D/C D/D Lidgerwood with boiler with 4 Independent clutch winch heads.
1—10x12 D/C D/D Lidgerwood skeleton.
10—8¼x10 D/C D/D with boiler, following makes: American, Lidgerwood, Clyde, Lambert, Flory, Reliance, Mundy and National.
55—Hoists, from 7x10 to 4¾x6, all makes.

LOCOMOTIVES

2—Davenport 24" gauge, 7½ ton saddle tank.
1—Vulcan 9x14, 36" gauge saddle tank.
1—Porter, 18 ton, saddle tank, 36" gauge.

PUMPS

1—Morris Centrifugal, 10 in. suction, 10 in. discharge, direct connected steam engine.
2—Morris Centrifugal Pumps, 6" suction, 5 in. discharge, direct connected steam engine.
1—Fairbanks-Morse Centrifugal 5" suction, belt driven.
5—Domestic Force Pump, 3 H.P. gas engine.

The above is only a partial list of our enormous stocks—we have Concrete Mixers, Derricks, Rollers, Pavers, Rail and Track, Steam Shovels, etc.

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DRYERS—Direct-heat rotary dryers, 3x25 ft., 3½x25 ft., 4x30 ft., 5x35 ft., 5½x50 ft., 6x50 ft., and 7x60 ft.; double shell dryers, 4x20 ft., 5x30 ft., and 6x35 ft.; steam-heated air rotary dryers, 4x30 ft., and 6x30 ft.

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Bucyrus, 40-ton, 1½ yard.
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American, 30-ton Std. Gauge Saddle Tank.
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48 Kopple 1½-yd. 24 Gauge, Illinois Delivery.

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Blaw Knox, one and two yds. Cap. Clam Shells.
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All in good condition.

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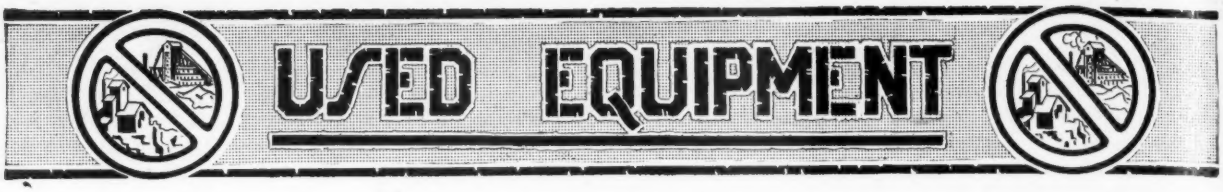

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One large revolving screen.

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1—Bucyrus dragline, 100-ft. boom, 3½-yd. bucket.
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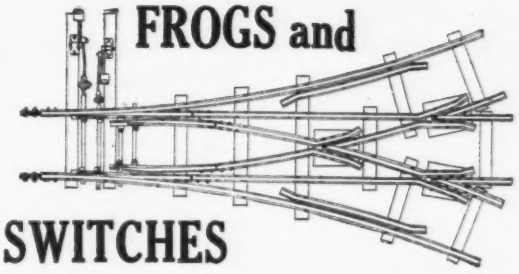

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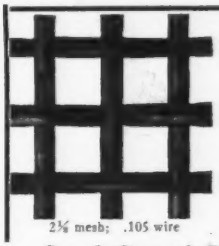

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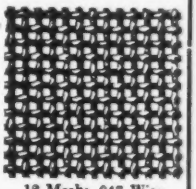

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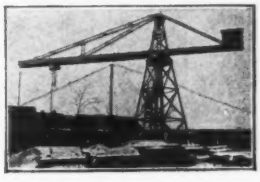

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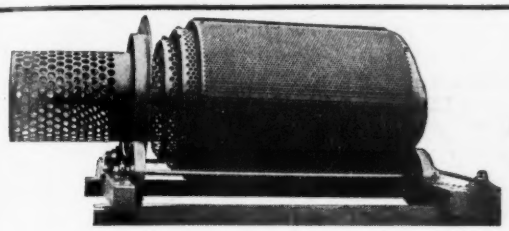

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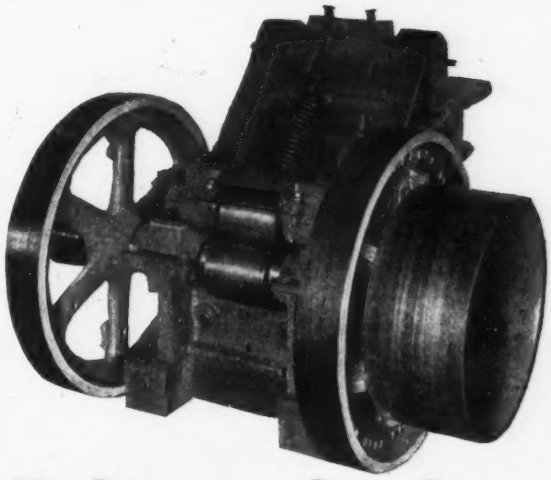

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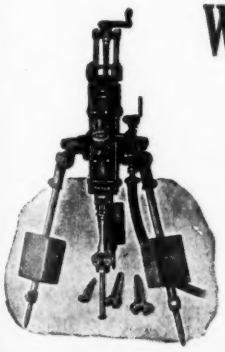

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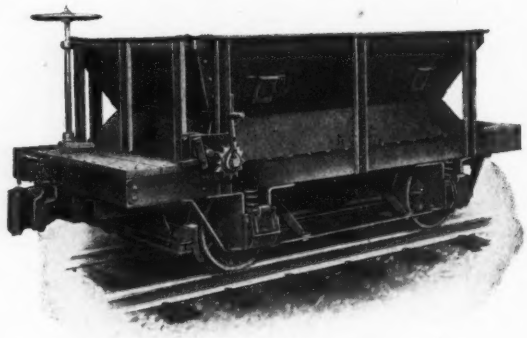

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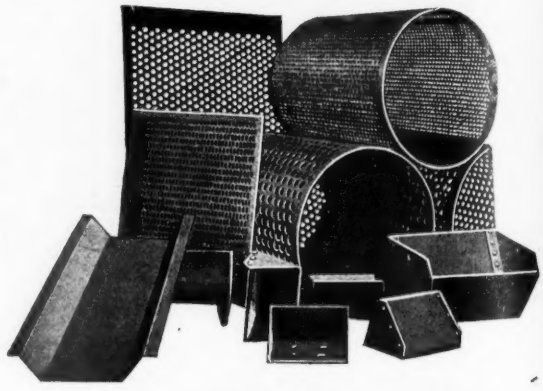

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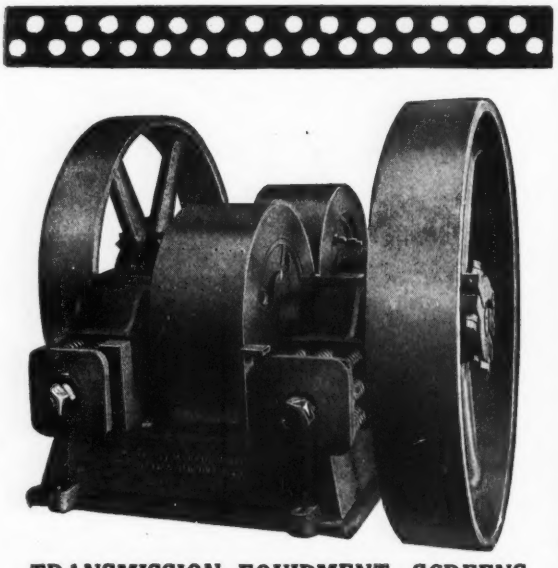

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It's a 20-Ton, 8-Wheel

OHIO CRANE
Serving a Concrete Mixer
Owner, Arthur McMullen, New York City

Outstanding characteristics of the Ohio Crane are: Simplicity of design—few parts—cut steel gears—bronze interchangeable bearings—all parts strong and large—ease and speed of operation.

Ask Us to Show You an Ohio at Work

OHIO LOCOMOTIVE CRANE CO.
Poplar Street - - BUCYRUS, OHIO

SAUERMAN
DRAGLINE CABLEWAY EXCAVATORS

How to Handle Either Large or Small Tonnage at a Profit

Among the users of Sauerman Dragline Cableway Excavators are many large tonnage gravel producers who have been compelled by the car shortage to operate their plants at far below their normal capacity.

Such a situation emphasizes the advantage of using a type of equipment that is low in operating and maintenance cost.

During this season the owners of large plants equipped with Sauerman Dragline Cableway Excavators have had an opportunity to realize more strongly than ever before the economy of these one-man operated, combined excavator-conveyors.

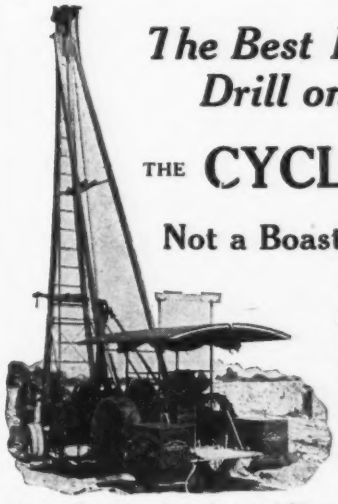
SAUERMAN BROS.
1140 Monadnock Block, Chicago

dig convey elevate & dump in one continuous movement under complete control of one man

The Best Blast-Hole Drill on Earth

THE CYCLONE. No. 14

Not a Boast—A FACT



We will prove the superiority of the No. 14 Drill by placing one of the outfits in your quarry against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint—it eliminates talking points and evaporates hot air. It puts buying on a strictly engineering basis where it belongs.

Furnished in Steam, Gasoline, Compressed Air or Electric Power Traction or Non-Traction

Let us send you full particulars

The Sanderson-Cyclone Drill Co.
ORRVILLE, OHIO

Eastern and Export Office 30 Church St., New York

HETTRICK CANVAS BELTING

Every User A Satisfied Customer

Hettrick Belts are made for service—made to stand the knocks. They are made from high-grade selected cotton duck, folded by hand—carefully constructed and inspected to insure maximum strength and long life.

Circular and prices gladly furnished upon request

The Hettrick Manufacturing Company

TOLEDO OHIO

Note These Please!

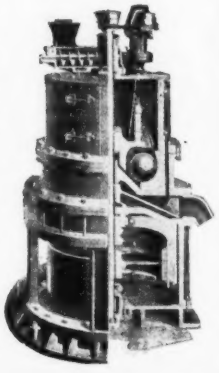
Points of superior merit guarantee economical operation of the Fuller Lehigh

Pulverizer Mill

They are unequalled for producing

Agricultural Limestone

Reduces lump rock to 20, 40, 60, 80, 100 or 200 mesh. Requires no outside accessory equipment. Requires no overhead shafts, drives or screens. All material discharged from mill is finished product. No inside journals or bearings. No inside lubrication. Uniform feeding system. Constant and free discharge. Low installation cost. Low operating cost. Low lubricating cost. Dustless operation. Built in sizes to meet the requirements of your trade. Grinds rock to meet the specifications of all Agricultural Experiment Stations.



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Fuller-Lehigh Company

MAIN OFFICE AND WORKS:

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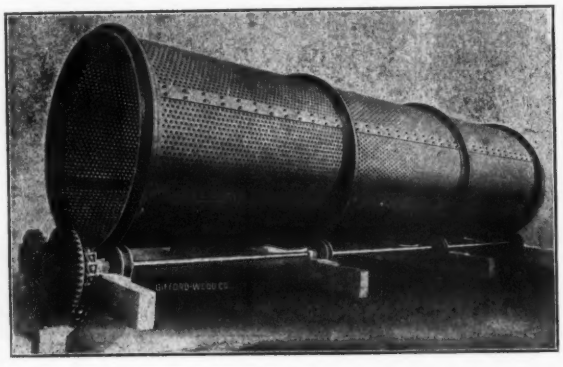
Branches: New York City, 50 Church St. First National Bank Bldg., Parsons, Kans. 719 Sheldon Building, San Francisco 714 L. C. Smith Building, Seattle, Wash. 1336 McCormick Building, Chicago, Ill. 25 Victoria St., Westminster, S. W. 1., London, England. Germany, Hamburg, 1, "Wallhof." Glockengiesserwall 2.



Screens of All Kinds
Also Conveying Machinery

for handling Crushed Stone, Gravel, Sand, Clinker and like materials.

You are invited to ask our cooperation at any time—preferably RIGHT NOW! Just sketch your problem briefly and you shall have a money-saving plan submitted you at once.

Catalogs mailed on request

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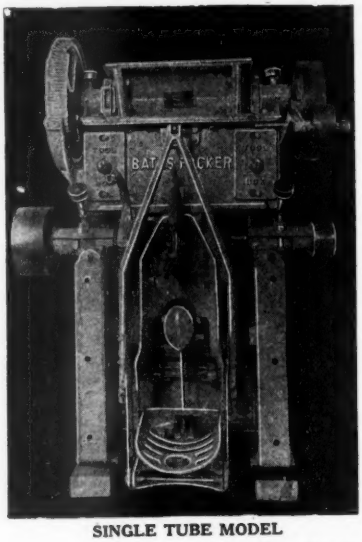
BATES
BAG FILLING MACHINE



SINGLE TUBE MODEL

will reduce your costs in filling bags with pulverized limestone, ground phosphate, gypsum, stucco, cement, Fuller's earth, paint fillers and other pulverized rock products.

Outstanding features of BATES Bag Filling Machines are:

Less Labor
Greater Output
Reduced Cost

Made in four sizes—single tube, two tube, three tube and four tube—respective capacities are 75, 150, 225 and 300 ton per day.

Send for Our Catalog

Bates Valve Bag Company

7310 South Chicago Ave. Chicago, Ill.

"WE have in the past operated other shovels that are good, but the ERIE is the best, being by far the most substantial. Our first ERIE has been digging and loading hard gravel for three years without any repairs, although we have worn out a dipper."—*(Signed) N. H. Battjes, President, STANDARD BUILDERS' SUPPLY CO., Grand Rapids, Mich.*

The ERIE is the RELIABLE shovel, and gives steady service in the hardest digging. Investigate carefully. Get all of the facts. Pick out the best steam-shovel.

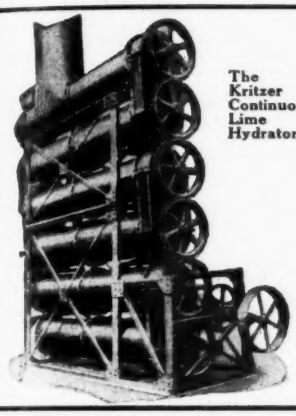
We will be glad to send your our Bulletin P. Write for it. Address:

BALL ENGINE CO., Erie, Pa.
Builders of ERIE Steam-Shovels and Locomotive Cranes.

ERIE Revolving Shovels

BALL Engine Co. Erie, Pa.

"Nothing for repairs in three years"



The Kritzer Continuous Lime Hydrator

Hydrating Lime

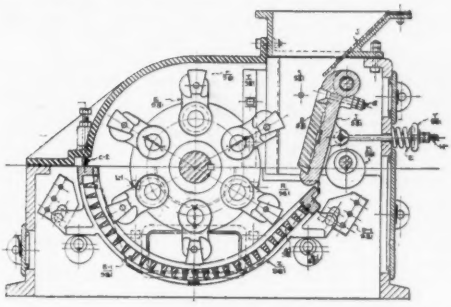
97% of Hydrated Lime is made either by the Old or by the New Kritzer Process. We Guarantee to manufacture the Best Product at the Lowest Possible Cost. Our engineers have worked out every practical improvement in use today in hydrating lime.

It is our business to solve your problems.
It is our business to investigate thoroughly the conditions that prevail at every plant, to work out all the details and to build a plant that will prove a success from the start.

We assume the Responsibility. Now is the time for you to act. Take the matter up with us NOW and we will outline your whole proposition for you.

THE KRITZER COMPANY
503 South Jefferson Street **CHICAGO, ILL.**

THE KENNEDY
Swing-Hammer Pulverizer

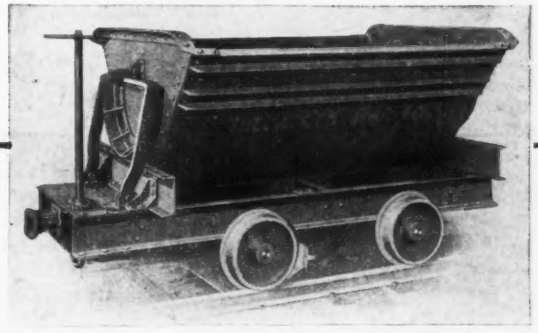


A Mechanically Perfect Device

The Kennedy Swing-Hammer Pulverizer embodies mechanical improvements heretofore considered unattainable. Reversible, renewable hammer tips and breaker plates of alloy steel. Impact pulverizing—no grinding movement. Adjustable steel grid—so controlled as to permit adjustment while machine is running. Automatic lubrication. Ball and socket bearings—in short, every possible improvement tending toward efficiency, durability and low maintenance expense.

Send for full description

Kennedy Van Saun Mfg. & Eng. Corp.
120 Broadway **New York**



An Ally of the Steam Shovel

Steam shovel loading shows up quickly on your dump cars, unless they are built for the strain.

This 217H Atlas Dump Car is as useful around the steam shovel as the coal that makes the power. You know that when the load falls from the bucket that this car will not falter.

The secret of the whole thing lies in the way we build it. If you haven't used one of these cars with the steam shovel you can't appreciate the advantage.

Better look into it.

The Atlas Car & Manufacturing Co.
ENGINEERS MANUFACTURERS
CLEVELAND, OHIO, U. S. A.

Detroit City Gas Co., Detroit, Mich.

AUTO-CRANE

BECKWITH PATENTS

Half a Crew Itself

THE AUTO-CRANE backs or moves up under its own power, easily placing heavy loads in exact position. Does it, too, in less time and with half the gang ordinarily required.

It also digs the trench, places the main and back-fills with simple changes from dragline, clamshell or orange-peel to hook, skip, etc.

Crawler, road-wheel or rail-truck mounting adapts the Auto-Crane for any footing. Gasoline, steam or electric operation permits the use of convenient power.

This flexible, compact machine serves a wide range of uses. The first cost is low, and additional equipment quickly pays for itself in extra earning power.

Write us about your work—we'll gladly show how the Auto-Crane fits in.

The John F. Byers Machine Co.
310 Sycamore Street, RAVENNA, OHIO
Sales Representatives in 25 Leading Cities

CROSS ENGINEERING CO. CARBONDALE, PA. PERFORATED SHEET METALS

PERFORATED STEEL SCREENS

The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge, and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

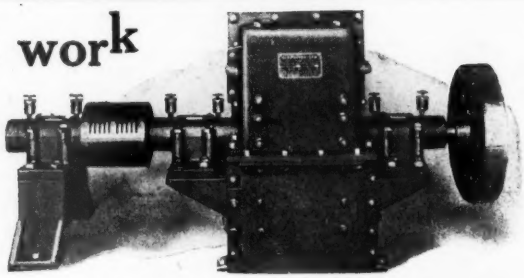
Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pennsylvania

By the very nature of the work

it is called upon to perform a pulverizer must be much stronger than the material it handles.

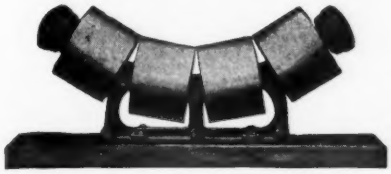
Only STEEL will stand the stress
"K-B" is built ALL-Steel



Catalog with full particulars on request

K-B PULVERIZER COMPANY, Inc., 92 Lafayette St. NEW YORK

K-B PULVERIZER



CALDWELL Belt Conveyors

Simple—Economical

will solve your handling problem. Simple in design, economical of power, they give the utmost satisfaction. Our forty years' experience has made us thoroughly familiar with the many details of construction necessary to success.

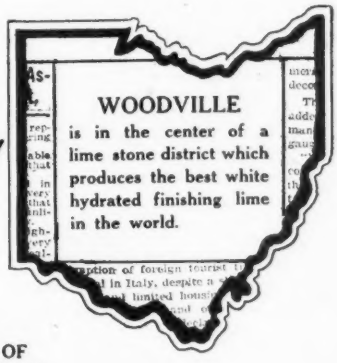
A rough sketch showing the conditions to be met at your plant will bring our recommendations. We should also know the capacity desired and the power available.

Get Catalog No. 38

H. W. Caldwell & Son Co.

Elevating, Conveying and Power Transmitting Machinery

Chicago 17th Street and Western Avenue — 50 Church Street New York, N. Y.



BUILDERS OF THE "ARNOLD" LIME KILN AND LINING

LOCATED IN THIS DISTRICT

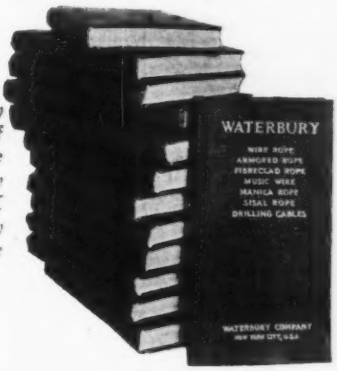
ARNOLD & WEIGEL

CONTRACTORS AND ENGINEERS

WOODVILLE, OHIO

Waterbury Wire Rope of iron, crucible cast steel, extra crucible cast steel and improved plow steel is made in all lays and standard sizes. Let us help you to select the right rope for your work, so that satisfactory service will be double sure. Waterbury quality in every grade is without a superior.

One hundred sixty thousand buyers of rope are using the Waterbury GREEN BOOK as a guide. A copy will be sent free on request.



WATERBURY COMPANY

63 PARK ROW, NEW YORK

Makers of Wire, Armored, Fibre and Fibre-clad Rope, also Music Wire

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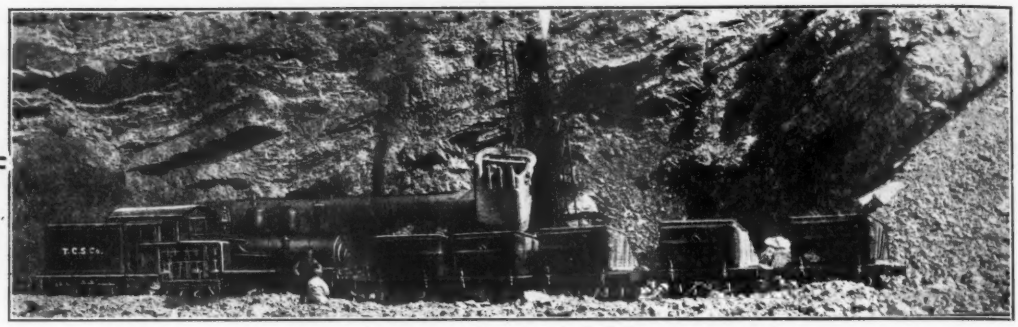


A "Shay" Spotting Cars for Steam Shovel Loading

Simple in Design, Rugged in Construction

"Shays" are far superior to Rod engines for pit and quarry work.

Their simple design and rugged construction make repairs infrequent.

Their flexible geared drive and small wheels permit satisfactory operation over rough, uneven track.

Their three cylinder engine pulls as steadily as an electric motor; this protects cars against jerks that pull out couplers.

"Shays" climb steep grades where Rod engines would be helpless.

"Shays" mean greater output than Rod engines at less cost for operation and maintenance.

LIMA LOCOMOTIVE WORKS, Inc.

LIMA, OHIO **30 Church St., New York**

Increase Your Production

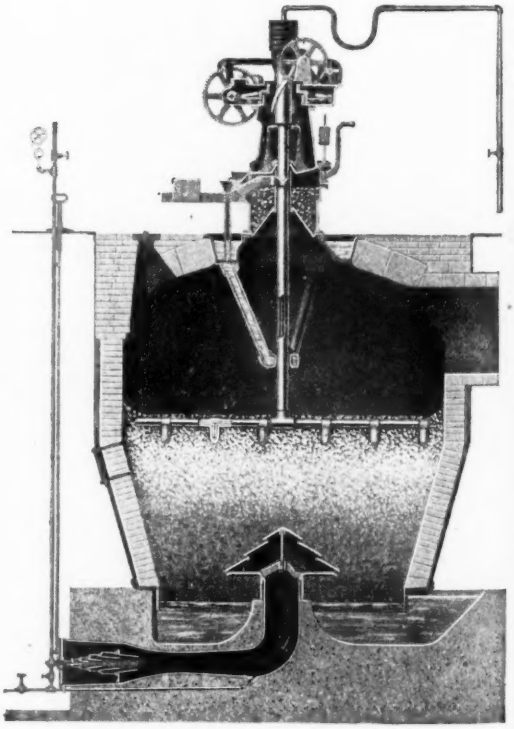
of high grade lime by heating your kilns with producer gas generated in

CHAPMAN Agitator Producers

They deliver a constant supply of high quality gas, thus insuring a uniform temperature in the kiln. This uniform supply of high quality gas burns with a long, clear flame which resembles the flame from a wood fire. The result is a greater production of first grade lime.

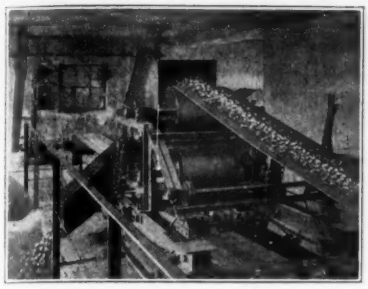
The Chapman Floating Agitator will increase the capacity and the efficiency of hand-poked producers already in operation.

Write us for special information



The Chapman Engineering Company

Oliver Bldg. Pittsburgh **MT. VERNON, OHIO** 11 Broadway New York



In a Class by Themselves

WELLER MADE CHICAGO

Heavy Duty Self-Propelling Trippers

(PATENTED)

Embodies Features Not Found in Any Other Fully Protected By Patents

Impossible for the belt to catch in the friction and cause an accident.

Adapted to the handling of ore, sand, gravel, crushed stone, lime, cement, gypsum, etc.

They have stood the test.

Write for Prices

Send Us Your Orders for Belt Conveyors, Bucket Conveyors, Pan Conveyors, Spiral Conveyors, Bucket Elevators, Bin Gates, Power Shovels, Car Loaders, Car Pullers, Pulley Hangers, Pillow Blocks, Gears, Sprockets, Weller Made Steel Chain.

WELLER MFG. CO.

CHICAGO

NEW YORK BOSTON BALTIMORE PITTSBURGH SAN FRANCISCO SALT LAKE CITY

The Traylor "Bulldog"

A Jaw Crusher with 80% Less Friction

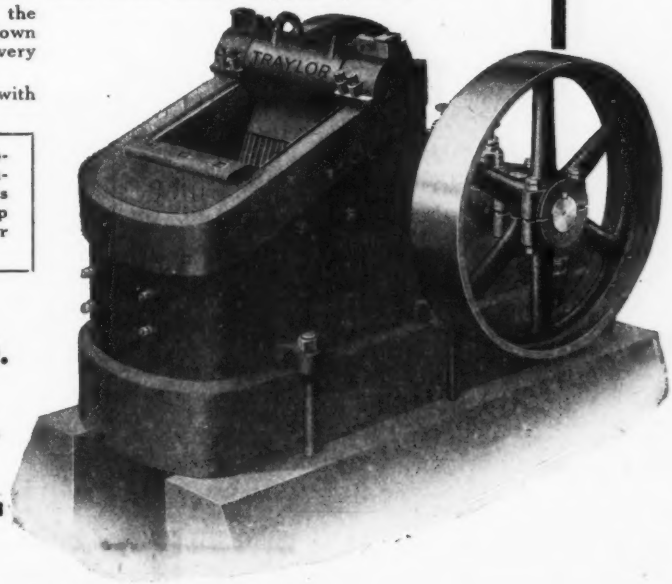
This remarkable economy is effected by improvements found only in the "Bulldogs"—the lighter but far stronger pitman and frictionless toggle system.

In place of a heavy and unreliable steel casting, the "Bulldog" pitman has two wrought steel rods of known strength that means absolute dependability, with the very minimum of weight.

The "Bulldog" Toggle System is self-aligning, and with toggle ends that roll on flat steel, it is **frictionless.**

We announce the conversion of our immense shipyard at Cornwells, Pa., into a plant for the manufacture of Motor Trucks and All Purpose Tractors of a quality equal to the best and which average up with the other older and world known Traylor products.

There are other "Bulldog" features worth knowing. Send for Bulletin RJX-1 TODAY!



Traylor Engineering & Mfg. Co.

Allentown, Pa.

New York 30 Church St. | Pittsburgh 211 Fulton Bldg.

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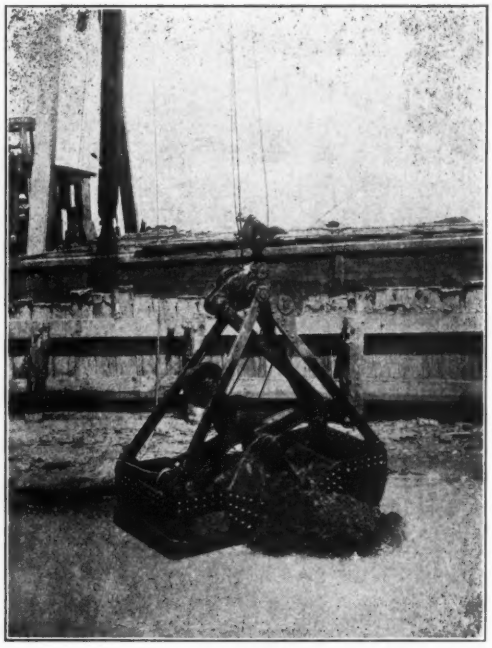
Famous "Buffalo" Buckets



Fill to Capacity With Every Grab

"Buffalo" Standard Type Clam Shell Buckets are scientifically constructed to render the longest and most satisfactory service. The patented Power Equalizing Arm is a distinctive feature of these buckets. It causes the scoops to travel with uniform speed, exerting tremendous pressure on the scoops during the closing operation, which insures the bucket filling to capacity at every grab.

Handle sand and gravel, coal and similar bulk materials with economy. Get the whole story in our latest Bulletin. Write for a copy today

Buffalo Hoist & Derrick Company
127 Erie Street Buffalo, New York

Also Manufacturers of Buffalo Hoists and "All Steel" Locomotive Cranes

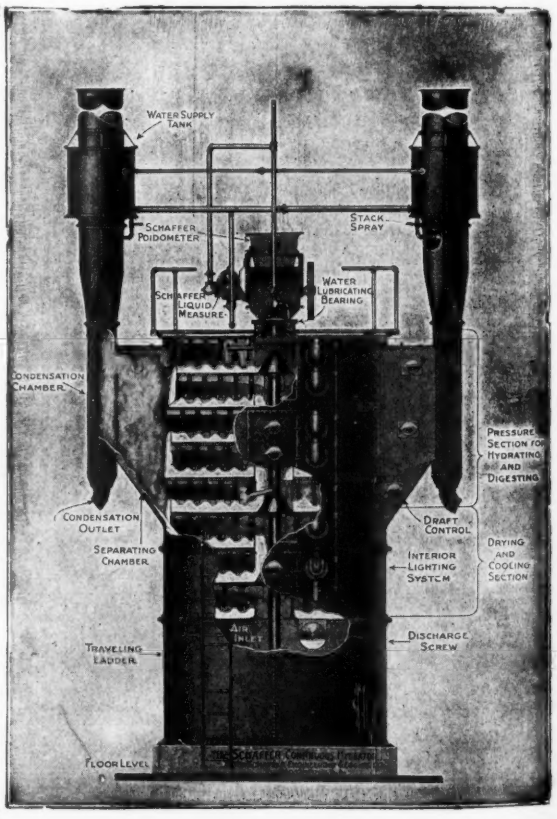
SCHAFFER
Continuous Lime Hydrators

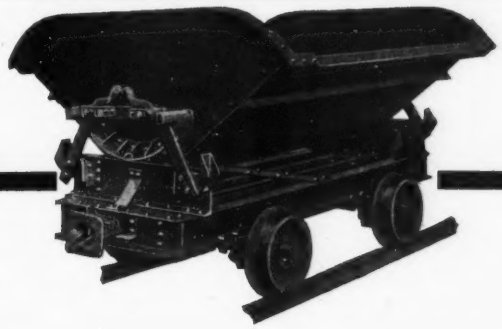
AUTOMATIC operation delivers lime by **weight,** not volume, to the Schaffer Hydrator. Automatically, water, too, is added in correct proportion—insuring a continuous flow of a superior product.

The flexibility of control enables the use of either high calcium or dolomite lime, while at the same time the automatic operation of Schaffer Hydrators solves the labor problem, as they require but little attention.

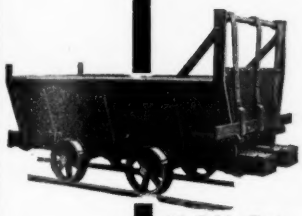
Our literature on the Schaffer Hydrator covers all the questions you now have in mind. Write for it at once!

Schaffer Engineering & Equipment Co.
Peoples Bank Bldg., PITTSBURGH, PA.



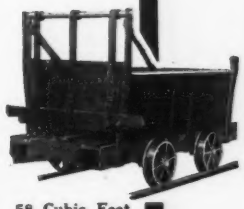


Capacity from 2 to 5 Yards



65 Cubic Feet

KOPPEL QUARRY CARS



58 Cubic Feet

Made in various types to fit every kind of Quarry service—Strong—Well Designed—well built cars that will give the maximum of life and wear.

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Koppel Industrial Car and Equipment Company, Koppel, Pa.

Sales Offices:

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Peoples Gas Bldg., Chicago
Farmers Bank Bldg., Pittsburgh
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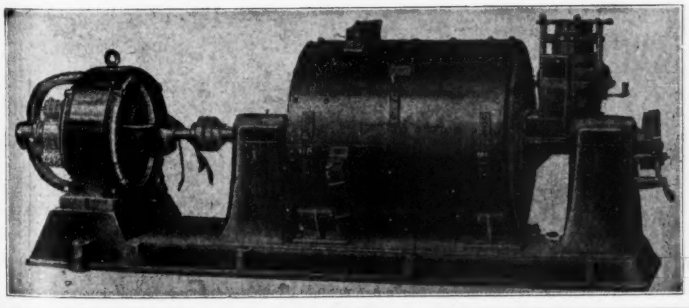
Koppel Sales Co., Rialto Bldg., San Francisco

ABSOLUTE SAFETY IN BURNING PULVERIZED COAL

By the Aero System there is no coal pulverized except for instant use. As conditions call for the supply so does the Aero produce the proper quantity. The hazard attendant upon storage of the coal powder is entirely eliminated.

There is nothing between the coal bunker and the furnace except the Aero, its motor and a plain pipe connection. Another feature with the Aero—if the coal supply is sheltered from rain and snow no artificial drying is necessary. Neither must the coal be of a very high grade—low cost slack coal can be made to yield its last B. T. U.

The AERO PULVERIZER



is designed as a complete unit for one furnace. They are built in five standard sizes ranging in capacity from 600 lbs. to 5,000 lbs. of coal per hour. Dust-proof and strongly built. All parts susceptible to wear are easy of access.

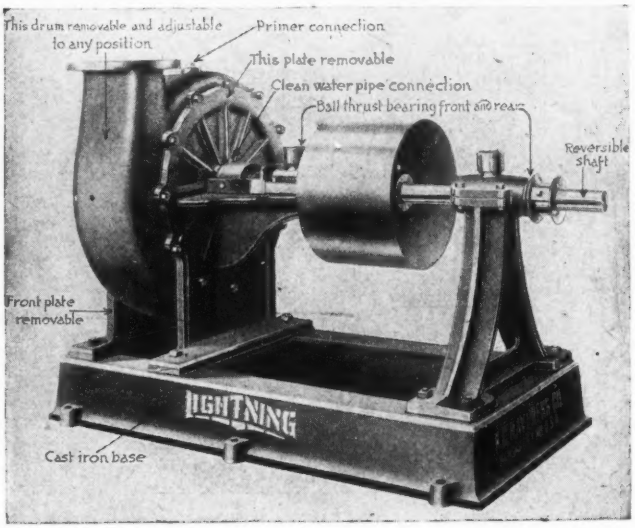
BACKED BY THE LONGEST SUCCESSFUL SERVICE

Write for Bulletin

AERO PULVERIZER CO., 120 BROADWAY, NEW YORK

The Truth is That

The Lightning Sand Pump is a Good Pump



Simplicity marks its design and construction

Lightning in operation
Lightning in adjustment
Lightning in replacement of parts

Therefore most hours in productive operation

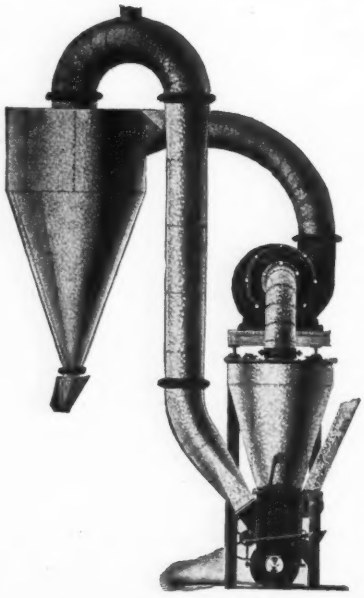
Shaft runs between ball thrusts. Chilled bumper in sand drum takes care of sand contact wear and can be easily replaced.

Full detailed description with prices on application

Address Pump Dept.

Kansas City Hay Press & Tractor Co., Kansas City, Mo.

From the Hardness of Coke to the Softness of a Material Like Lithopone Is a Long Range in Hardness



Still Raymond Mills pulverize both with ease and economy to the user. Capacities can be handled from 100 pounds per hour to 8 or 10 tons per hour and with a range of fineness from 80 mesh to 350 mesh.

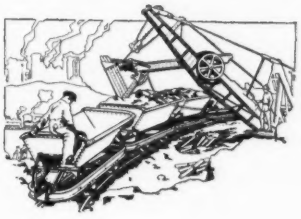
Our engineering experts are at your service for consultation as to the best method to use for grinding any material and the advice they give is based upon forty years in the fine grinding field.

Raymond Bros. Impact Pulverizer Company

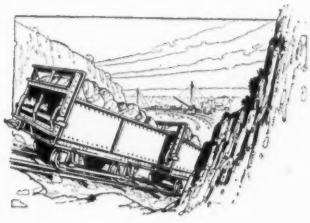
Western Office:
201 Boston Bldg., Denver, Colo.

1301 North Branch St., Chicago, Ill.

EASTON
INDUSTRIAL RAILWAY
CARS



Rocker Dump Cars of standard or special design and sturdy Easton construction for handling almost all classes of loose material. Also scoop cars, cradle dump cars, skip cars, quarry cars, and gable bottom cars.



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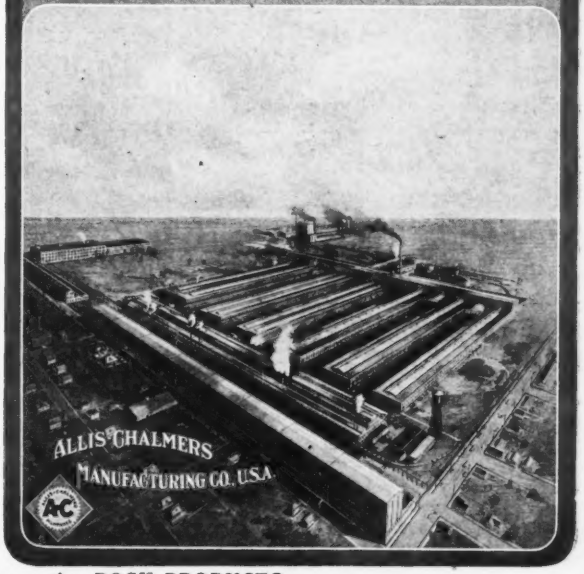

Buyers' Guide of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

AIR COMPRESSORS
Worthington Pump & Mach. Co., New York City.

BAGS AND BAG MACHINERY
Bates Valve Bag Co., Chicago, Ill.
Jalta Company, The, Jalta, Ohio.
Valve Bag Co. of America, Toledo, Ohio.

BELTING
Cincinnati Rubber Mfg. Co., Cincinnati, Ohio.
Hetrick Mfg. Co., Toledo, Ohio.
Main Belting Co., Philadelphia, Pa.
New York Belting & Packing Co., New York City.
U. S. Rubber Co., New York City.

BELT FASTENERS
Crescent Belt Fastener Co., New York City.

BELT LACING
Crescent Belt Fastener Co., New York City.

BELT RIVETS
Crescent Belt Fastener Co., New York City.

BINS, STORAGE
Preston Co., J. M., Lansing, Mich.
Weller Mfg. Co., Chicago, Ill.

BRICK MACHINES
General Service Corp., Chicago, Ill.
Wert Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES
Aetna Explosives Co., N. Y. City
Atlas Powder Co., Philadelphia, Pa.
Du Pont de Nemours & Co., E. I., Wilmington Del.
Grasselli Powder Co., Cleveland, Ohio.

BUCKETS, ELEVATOR
Hendrick Mfg. Co., Carbondale, Pa.

BUCKETS
Advance Eng. Co., Cleveland, O.
Brown Hoisting Mach. Co., Cleveland, Ohio.
Browning Co., Cleveland, Ohio.
Buffalo Hoist & Derrick Co., Buffalo, N. Y.
Marion Steam Shovel Co., Marion, Ohio.
McMyler Interstate Co., Cleveland, Ohio.
Owen Bucket Co., Cleveland, Ohio.

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Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.

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Columbus-McKinnon Chain Co., Columbus, O.
U. S. Chain & Forging Co., Pittsburgh, Pa.

CHAINS, DREDGE
U. S. Chain & Forging Co., Pittsburgh, Pa.

CLIPS, WIRE ROPE
American Hoist & Derrick Co., St. Paul, Minn.

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Good Roads Mach. Co., Philadelphia, Pa.
Jeffrey Mfg. Co., The, Columbus, Ohio.
Link Belt Co., Chicago, Ill.
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Robins Conveying Belt Co., New York City.
Smith Eng. Works, Milwaukee, Wis.
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Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

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American Crane & Eng. Co., Toledo, Ohio.
American Hoist & Derrick Co., St. Paul, Minn.
Advance Eng. Co., Cleveland, O.
Ball Engine Co., Erie, Pa.
Brown Hoisting Mach. Co., Cleveland, Ohio.
Browning Co., Cleveland, Ohio.
Byers Mach. Co., John F., Ravenna, Ohio
Chisholm-Moore Mfg. Co., Cleveland, Ohio.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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Austin Mfg. Co., Chicago, Ill.
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Buchanan Co., Inc., C. G., New York City.
Bradley Pulverizer Co., Allentown, Pa.
Butterworth & Lowe, Grand Rapids, Mich.
Chalmers & Williams, Chicago Heights, Ill.
Fuller-Lehigh Co., Fullerton, Pa.
Gruendler Pat. Crusher & Pulv. Co., St. Louis, Mo.
Jeffrey Mfg. Co., The, Columbus, Ohio.
K. B. Pulverizer Co., New York City.
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Kent Mill Co., Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co., Lewistown, Pa.
McLanahan-Stone Mach. Co., Hollidaysburg, Pa.
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co., Chicago, Ill.
Smidth & Co., F. L., New York City.
Smith Eng. Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Universal Crusher Co., Cedar Rapids, Iowa.
Universal Road Mach. Co., Kingston, N. Y.
Webb City & Carterville F. & M. Works, Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.
Worthington Pump & Mach. Corp., New York City

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American Hoist & Derrick Co., St. Paul, Minn.
Buffalo Hoist & Derrick Co., Buffalo, N. Y.
Terry Mfg. Co., New York City.

DRAGLINE BUCKETS
Brown Hoisting Mach. Co., Cleveland, Ohio.

DRILLS
American Well Works, Aurora, Ill.
Sanderson Cyclone Drill Co., Orrville, Ohio.
Wood Drill Works, Paterson, N. J.

DRYERS
American Process Co., New York City.
Ruggles-Coles Eng. Co., N. Y. City.
Vulcan Iron Works, Wilkes-Barre, Pa.

DYNAMITE
Aetna Explosives Co., New York City.
Atlas Powder Co., Philadelphia, Pa.
Du Pont de Nemours & Co., E. I., Wilmington Del.
Grasselli Powder Co., Cleveland, Ohio.

ENGINES, OIL & GAS
Worthington Pump & Mach. Co., New York City.

ENGINES, STEAM
Morris Mach. Works, Baldwinsville, N. Y.

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Arnold & Weigel, Woodville, Ohio.
Bacon, Earle C., Inc., New York City.
Bradley Pulv. Co., Allentown, Pa.
Buckbee Co., J. C., Chicago, Ill.
Fuller Engineering Co., Allentown, Pa.
James N. Hatch, Chicago, Ill.
R. W. Hunt & Co., Chicago, Ill.
Massey Co., Geo. B., Chicago, Ill.
McAuliffe, P. J., N. Y. City
Ross Engineering Co., Chicago, Ill.
Smidth & Co., F. L., New York City.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Yates, Preston K., New York City.

EXCAVATORS
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Green, L. P., Chicago, Ill.
Marion Steam Shovel Co., Marion, Ind.
Owen Bucket Co., Cleveland, Ohio.

EXCAVATORS
Dragline Cableway
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Sauerman Bros., Chicago, Ill.

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DuPont de Nemours & Co., E. I., Wilmington, Del.
Grasselli Powder Co., Cleveland, Ohio.

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International Clay Mach. Co., Dayton, Ohio.

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Chisholm-Moore Mfg. Co., Cleveland, Ohio.
Vulcan Iron Works, Wilkes-Barre, Pa.

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HYDRAULIC DREDGES
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Easton Car & Constr. Co., Easton, Pa.
International Clay Machine Co., Dayton, Ohio.
Koppel Indust. Car & Equip. Co., Koppel, Pa.
Watt Mining Car Wheel Co., Barnesville, Ohio.

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Vulcan Iron Works, Wilkes-Barre, Pa.

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Jeffrey Mfg. Co., The, Columbus, Ohio.
Portable Mach. Co., Passaic, N. J.

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Fate-Root-Heath Co., Plymouth, Ohio.
Jeffrey Mfg. Co., The, Columbus, Ohio.
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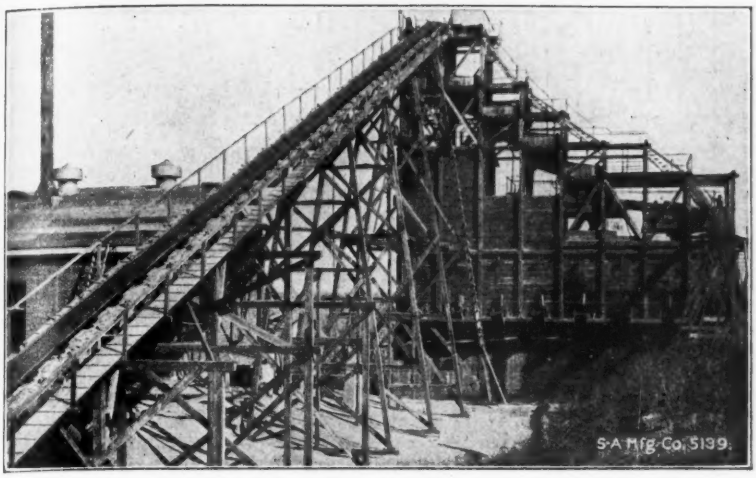

Anticipate Your Requirements for Next Season

Sand and gravel plant operators should give consideration to their requirements for the season of 1921. Preliminary plans may be prepared for consideration with the purpose in mind of placing contracts within the near future. To insure operation of new equipment at the opening of next year's season, it is important that orders be placed as soon as possible.

S-A engineers will be glad to co-operate with operators or prospective operators concerning new projects or improvements and extensions to present equipment. Capable engineers are available for conference and this service is rendered without charge.

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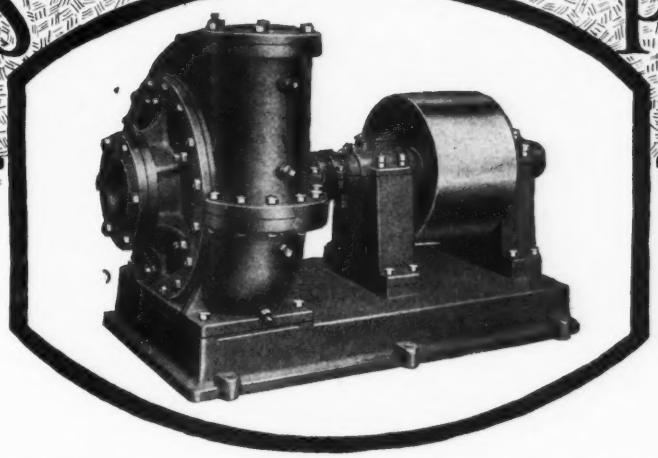
MORRIS PUMPS



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Write for Bulletin 19-B

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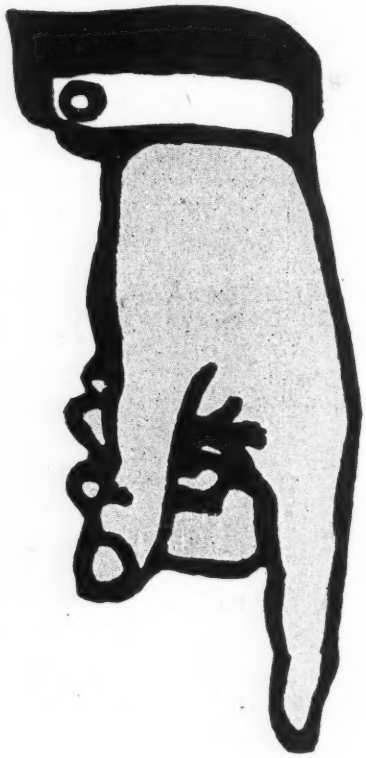

A good habit adds to one's personal enjoyment and often exerts a helpful influence upon one's business success. It is a good habit to regularly read the business periodical devoted to the industry in which one is engaged. You get the news—you keep posted on what is going on; you also obtain fact stories of plant operation, descriptions and illustrations of new methods, processes, equipment, a host of ideas that will help you to operate your own plant more efficiently and profitably. Take this copy of ROCK PRODUCTS—read it through carefully. Note the large amount of practical and helpful information and ideas—then consider how little it costs to have this paper sent to you regularly—26 issues a year. Cheaper to get it than to go without it.

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